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ABSTRACT

This book suggests strategies for creating meaningful project and work-based learning experiences that were developed by teams of vocational and academic teachers and addresses the support issues necessary to sustain successful efforts. It begins with a description of the design team model and activities of the Vocational Integration with Academics (VIA) Project in Years 1 and 2. It lists the five principles of academic and vocational integration that form the framework within which the design teams went about their work of creating VIA projects and curriculum units. The main body of the manual consists of the seven best practices for academic-vocational integration that form the cornerstone of the VIA Project's work on integration. The strategies shape the organization of the manual, with one to four appropriate VIA curriculum examples used as illustrators for each strategy. Each curriculum example may contain some or all of these components: description of units or themes; course summary; curriculum outline; and examples of group projects. The seven integration strategies are as follows: (1) a drive for authenticity; (2) students as producers of knowledge; (3) building transferable skills; (4) technology education for science; (5) doing well and doing good; (6) work as context; and (7) self-determined learning. An appendix contains addresses and telephone numbers of contact people for projects, programs, and curricula highlighted in the manual. (YLB)

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THE VIA BOOK

A Best Practices Manual From
The Vocational Integration With Academics Project
at The Rindge School of Technical Arts

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THE VIA BOOK

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The VIA Project

The VIA project was funded by a grant from the U.S. Department of Education's Office of Adult and Vocational Education. This book, and much of the curriculum outlined within it, were created by teams of vocational and academic teachers from :

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and the
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Preface

Vocational Integration With Academics: The Good, The Bad, and The Ugly

Notes from the Project Director

"VIA" is both an acronym and a word. As an acronym, it stands for our Project's name: Vocational Integration with Academics. As a word, it signifies our understanding that this integration is not an end in itself, but rather a means for detracking and restructuring high schools. At its best, the Project demonstrates that both the vocational and the academic wings of the comprehensive high school have something substantial to bring to the restructuring table.

Confucius said, "In order to change a society you must change its language first." Words like vocational conjure up images of the industrial age, of shops, of tracking, of programs for the non-college bound, and of "other people's children." We use it here to mean the use of tools, techniques, and materials in contextual and experiential learning environments. The word academic in the American Heritage Dictionary is defined as "relating to studies that are liberal or classical rather than technical or vocational". We use it here to mean creative intellectual work, which the VIA Project sought to bring to all students through learning to use their hands and their minds, and to use both well.

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One hundred years ago, John Dewey predicted the undemocratic and inefficient result of separating hand and mind, of cleaving training for narrow occupations from preparation for citizenship and for further learning. Through the VIA Project we have come to a deeper understanding of this predicted result, and of the influences a school must get itself clear of in order to "cut across" the disciplinary divide.

Integrated studies by its very nature bumps up against the deeply-ingrained high school culture of fragmented, discipline-based study. Seventy-five years ago the creation of the Carnegie units of English, history, math, and science gave rise to the current powerful constituencies for each subject area - supported by separate departments, teacher training and certification, professional organizations, textbooks, curriculum frameworks, and standards. These supporting structures give rise to a high school culture characterized by teacher loyalty to discipline and the subject status hierarchy of the Carnegie "big four" (English, history, math, and science) over all other endeavors (e.g. art, music, vocational education, and school to work). The evidence of this hierarchy can be found in, among other things, student transcripts, school schedules, teaching assignments, and local budget priorities.

Into such a high school structure and culture come the Perkins Applied Technology and Vocational Education Act of 1990 and the School to Work Opportunities Act of 1994. At the core of these Acts, codified and writ large, is a call for integrated study that reflects realities of citizenship and of the workplace, as opposed to the artificial fragmentation and segregation of knowledge and skill. Thus the work of the VIA Project is situated at the interstices between two worlds: the world of high schools and the world beyond. The structure and culture of the former remains fundamentally unchanged and has become increasingly anachronistic, while the latter has seen profound economic and cultural change in families, communities, workplaces, and technologies.

Nothing is more emblematic of this growing disparity than high school exit requirements, which, hand-in-glove with post-secondary entrance requirements, drive the high school curriculum. These have not changed in seventy-five years. It is significant, and symbolic, that the Carnegie Foundation should be the sponsor of Breaking Ranks , the report of the National Association of Secondary School Principals [NASSP] which calls for an end to Carnegie units. This important report, like its predecessor,Prisoners of Time, recognizes that the problem with the Carnegie units lies not only in its fragmentation of curriculum, but also in its delivery through a time-based, rather than a performance-based, system. We are all products of this time-based system: four years of English, three of math, etc. But this system is not a reliable indicator of what a student knows and is able to do. This view is supported by the past fifteen years of research in cognitive science, as well as by employers, who have little regard for the predictive validity of the high school diploma.

Schools cannot achieve vocational and academic integration without a deep rethinking of teaching and learning. In doing so, they must struggle with more authentic means of assessment than the typical, Carnegie unit-based, high school transcript. Schools which are having a truly transformative effect on their students, as a few schools are, must demonstrate these results to parents, community partners, and college admissions officers. Some such schools have worked closely with admissions officers over years to demonstrate the rigor and predictive validity of more authentic assessment and documentation.

Our work on the VIA Project comes out of this history, present federal policy, and our experience and understanding of the structural impediments to the substantial school change required for significantly improved student performance. It is important to note that we do not make the case for integrated study in lieu of student achievement in literacy, numeracy, and other essential academic skills; but rather see the efficacy of creative intellectual development within the context of real world-related, project-based study. What follows, in this regard, is the work of one small school.

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Acknowledgements

This book is the creation of many educators. An attempt to recognize everyone who played a role in the VIA [Vocational Integration with Academics] Project is not easy, as so many people contributed in so many ways.

We thank first the students of the Rindge School of Technical Arts and of the Cambridge Rindge and Latin School. They are the pioneers who first ventured through this curricula, and whose energy, critical eye, and sense of contrivance helped to make it more real and more vital. This book was created for them, and for their successors in Cambridge and in other communities.

Funding for this work came from the National Demonstration Program of the Office of Vocational and Adult Education of the U.S. Department of Education. We thank, in particular, our program officer Pariece Wilkins, whose patience, support, and good humor helped to carry us through the inevitable snags and hurdles of a project of this size.

VIA was a project of the Hands and Minds Collaborative, a joint venture of Rindge and the Center for Law and Education. Paul Weckstein, co-director of the Center, is the tireless advocate and architect of federal policy regarding the integration of vocational and academic education.

Mary Lou McGrath, Superintendent of the Cambridge Public Schools, launched us with a charge to "turn it upside down and inside out", and always encouraged and supported us as we endeavored to do so.

Pat Murphy, Deputy Superintendent of the Cambridge Public Schools, helped us negotiate our way through institutional mazes with his caring style, wit, and humanism.

David Kale, of the Cambridge Schools Financial Management Office, gave us hours of assistance with both the big and little financial picture.

Adria Steinberg, Academic Coordinator of the Rindge School of Technical Arts, is, more than anyone, the brains and drive behind this effort. As co-director of the VIA Project, she employed her uncanny ability to find the root of a problem, and a laser-like focus that leads us all to its solution.

Tamara Berman is, with Adria, the principal author of this book. She brings the rare blend of a teacher who both does it and describes it well.

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David Stephen, teacher and artist, designed the layout of this book. His creative gifts are evident here and in his work as the principal force behind CityWorks, our best known program.

Rob Riordan, Language Arts Coordinator K-12 for the Cambridge Schools, taught us how to bring the humanities to vocational education and how to bring vocational education to the humanities. His seasoned emphasis on students' "writing to learn" is a guiding light that deepens our understanding and our practice.

This book contains selected exemplars written by David Stephen, Manny Goncalves, Greg Zaff, Tamara Berman, Vinny Finn, Francesca Binisecchi, Tony Russo, John Shea, and Roy Carter, Serafim da Cunha, Maria Ferri, Phyllis Bretholtz, Chris Hallice, Lili Allen, and Adria Steinberg. VIA Project Team participants include Larry Aaronson, Martha Bedrosian, Jorge Cardoso, Roy Carter, Bernie Cullen, Jim Delena, Brad Derocher, Phil Dussault, Riley Hart, Tom Hsu, Hollington Lee, Linda Lipkin, Tom Lividoti, Peter Kastner, Frank McCarthy, Nadine Nelson, Albert Newton, Al Stowell, Bill Tobin, John Urbahn, Julie Ann Villa, and Rosalie Williams.

The photographs for this book were taken of students involved in VIA projects and courses during the 1995-1996 school year. Primary photographs were taken by Jethro Rice and Phyllis Bretholz, with additional contributions by Tamara Berman, Maria Ferri, and John Shea.

We benefit from the very special talents of outsiders that an academic community like Cambridge affords: Tom Hsu of the Cambridge Physics Outlet, Margaret Vickers of TERC, and Cheryl Almeida and Bruce Astrein [documentation and evaluation].

Larry Rosenstock
Co-Director
15 February 1997

RSTA Curriculum Integration: The Design Team Model

In September 1990, a little over 100 years after its 1888 founding as the second public vocational high school in the United States, the Rindge School of Technical Arts (RSTA) undertook a major restructuring effort. The school's veteran faculty, new executive director, and new academic coordinator, operating with the full support of the superintendent of the Cambridge Public Schools, set out to "turn the [vocational] program upside down and inside out."

The goal was to create a challenging core academic program that would be integrated with traditional technical shop programs that were isolated and autonomous. Toward this end, newly-established team meeting periods were built into both vocational and academic teachers' daily schedules, creating significant blocks of collaborative time.

Underlying this structural change was an assumption that set this effort apart from many efforts to reform schools. Instead of relying on packaged materials or training programs, the Rindge reform initiative relied on design teams of teachers. As academic coordinator, Adria Steinberg, put it: "We knew if we wanted a program where students become smarter, we had to create one which called upon teachers to be smart." No longer operating in isolation, vocational and academic teachers for the first time began to explore together the possibilities inherent in taking a more collaborative and integrated approach to educating young people.

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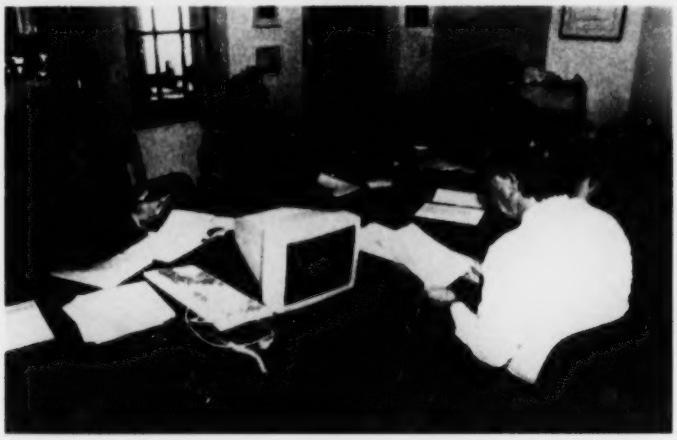

The VIA Project: Year 1

In early 1994, RSTA became one of eleven programs nationally to receive a grant from the U.S. Department of Education to develop new ways to integrate vocational and academic learning. The resulting Vocational Integration with Academics Project (VIA) of RSTA and the Cambridge Public Schools set about its now federally-mandated integration work framed by two central assumptions: 1) Combining vocational and academic methodologies, content and skills results in more powerful learning than either vocational or academic courses taught in isolation from one another. 2) When learning in the school connects with the needs and resources of the outside community, students' motivation and interest in learning dramatically increases and their future options broaden.

The first year of VIA began with the establishment of four multi-disciplinary design teams of teachers, each corresponding to a broad career path—Industrial Technologies and Engineering; Business and Entrepreneurship; Health and Human Services; and Arts and Communications. The main goal of Year 1 was to create innovative projects that would integrate academic and vocational methods and content. These projects would become the building blocks for modifying existing courses, for developing new courses, and eventually for creating career paths that would offer students opportunities to enter internships through which they could reinforce and extend classroom learning and contribute to the revitalization of their community.

Seeking Further Definition:

Principles of Academic and Vocational Integration

Drawing on lessons learned in the first several years of reform at Rindge, the VIA co-directors and staff agreed on five overall principles of academic and vocational integration. These became the framework within which the design teams went about their work of creating VIA projects and curriculum units.

1. In an integrated and authentic learning environment it is difficult to tell whether the setting is an "academic classroom" or a "vocational shop."

2. School work revolves around projects that resemble real world problems and tasks. Such projects:

   - arise from a real need
   - take time, are often "messy", hard to define/solve
   - are multi-disciplinary and multi-craft
   - require investigation
   - benefit from collaboration
   - require appropriate tools and technologies
   - require a tangible result or end product

3. Students engage in community and workplace learning projects. These might include community development projects in which students act as consultants on community issues as well as job shadowing or rotations at worksites.

4. Students reflect on and connect what they are learning and doing in school with what they are learning and doing outside.

5. Projects culminate in presentations to real audiences whose members have a genuine interest and a real stake in what students are doing.

Working within this framework and within the structure of design teams, teachers developed 24 curricular projects during this first year. These ranged in scope from 3-4 week units within a larger course to plans for whole new courses and programs.

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The VIA Project: Year 2

The goals of the second year of VIA were to identify and articulate an emerging list of workable strategies for academic-vocational integration, to apply the work begun in the first year specifically to those strategies, and to refine and combine VIA curriculum products into a concise and workable model of integration that other high schools around the country might choose to replicate.

Organization of this Manual:
Seven Integration Strategies

The seven Best Practices Strategies for Academic-Vocational Integration that follow form the cornerstone of the VIA Project's work on integration. These strategies shape the organization of this manual, with appropriate VIA curriculum examples used as illustrators for each strategy.

Integration Strategy

Create new project-based courses that are 100% academic and 100% vocational. Students develop knowledge and habits of mind, social skills, and work dispositions that are essential for further learning.

CityWorks: Combines key characteristics of vocational programs— a project approach, apprentice-master relationships, and real clients—with the broader content and essential skills of academic education, with a particular emphasis on communicating ideas in written and oral form, as well as through two and three-dimensional modeling. Working in teams with academic and vocational teacher-leaders, students identify unmet community needs and then produce projects for presentation to selected community representatives.

Integration Strategy

Transform existing courses and technical/production activities through combining an integrated, interdisciplinary approach and a "real world" focus. Students become producers of knowledge both in and out of class.

Street Kids Around the World: Integrates science with humanities, bringing an architectural design, building and engineering focus to the traditional social studies classroom. Students study the problems and effects of child homelessness, and design, build and test prototypes of inexpensive temporary shelter for homeless people.

Integration Strategy

Transform traditional shops to centers of technology-based projects, products, and services.

IMAGE Center: Transforms the old-fashioned "print shop" into an up-to-date Image Center. Students use computer-based technology to create images that customers need to promote their products or services, including customized logos for stationery, tee shirts, newsletters, and banners.

Integration Strategy

Combine the teaching of technical procedures (the "hows") with the scientific principles underlying these procedures (the "whys").

Tech Ed: Brings construction, energy and transportation projects and technologies directly from the vocational shops into the Tech Ed science lab where students are able to engage in hands-on learning of key science principles.

Integration Strategy

Connect coursework to community resources and needs.

Cambridge Service Corps: Human relations government and economics are investigated through a combination of classroom study and extensive community-based work. Working in partnership with a wide array of public, non-profit, and private sector representatives, students design and carry out their own community initiative, after participating in a community needs assessment and developing a shared vision for their collective community.

Integration Strategy

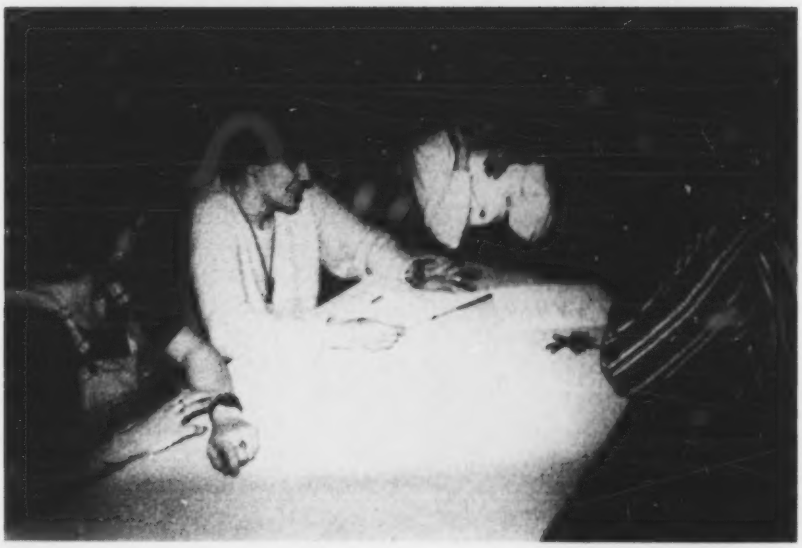
Create opportunities for intensive forms of work-based learning.

RSTA Internship Program: Students spend half of their junior or senior year in an internship placement, learning skills that help prepare them for the independent learning environment of college, as well as for the workplace. The programs include a concrete context for learning (the workplace); a reflective context for learning (the integrative seminar); relationships with adult mentors; action-based projects that link the seminar, the workplace and academic disciplines; and public presentations and exhibitions of student work.

Integration Strategy

Involve students in developing independent projects that have lasting value beyond the classroom and culminate in an assessment by outside experts.

Senior Project: This is a culminating experience where upper-level students, working under the guidance of teacher-advisors from a wide array of disciplines, and community mentors, undertake a significant piece of independent work. Successful projects build upon students' previous work in integrated content exploration, presentation and community building activities.



We cannot eliminate the academic subjects themselves, nor can we do away with the occupations and trades. Even if we do not like the structures for knowledge creation that shape both practical and theoretical knowledge in the adult world, we have to live with them. The best thing curriculum developers can do is to ensure that the school subjects are not presented as independent and inert constellations of knowledge, but rather as richly interdependent ways of making sense of the world."

Margaret Vickers, Working to Learn Project

4 INTEGRATION STRATEGY

A DRIVE FOR AUTHENTICITY

Creating New Project-Based Courses That Are 100% Academic and 100% Vocational

To do well in school, students have to learn to answer questions and carry out assignments made by the teacher, and to come up with correct responses on tests. Doing well in life requires an entirely different set of skills—planning, organizing, finding information, working with others, testing out ideas and trying again. By the time students leave high school, it is important that they have learned how to carry out complex, multi-step projects. Unfortunately, schools do little to foster this knowledge.

"Students need an apprenticeship in project-doing," is the way VIA co-director, Adria Steinberg explains it. The first integration strategy is thus to create new project-based courses where freshmen and sophomores become adept at doing projects—developing and contributing their own skills as they address real problems outside the classroom walls.

Project-based courses, formed from curriculum frameworks that incorporate academic and vocational knowledge, skills and dispositions, offer the greatest chance for authenticity. Because it is within an integrated environment of project-based, hands-on, and intellectual labor that much of the work occurring in the "real world" (outside of schools) takes place, it becomes increasingly essential that we replicate these efforts in the classroom.

If we want our students to take the work of learning seriously, we must show them that there are adults on the outside, actually doing similar work, who take the students' work seriously. One way to achieve this is to create learning environments that are not bound and separated by the artificially imposed lines of academic versus vocational disciplines.

New hybrid, academic-vocational, project-based courses allow teachers to bring a much higher level of workplace authenticity to students. The very look and feel of such courses is essentially much more "real." Student productivity and investment in "real-world" work is always greater than that given to artificially-created "school-world" work (which often tends to be either exclusively academic or vocational). In fact, the very notion that either discipline could operate on its own, without the other, would seem to insure its inauthenticity since in the real world the two are rarely separated.

A hybrid, project-based course anchors both the freshman and the sophomore years in RSTA. CityWorks (freshman year) and Pathways (sophomore year) offer abundant opportunities for invention and creativity, teamwork, time and resource management, problem-solving, and public presentation. They also offer gateways to student empowerment, as students become much more aware of and responsible for their own learning, and as they see themselves as contributors and producers, not just consumers. CityWorks and Pathways provide an action lab setting for doing project work. When project work occurs in other classes, students often are not given the time and support to do them well. In CityWorks and Pathways, the project drives the curriculum and students can count on coaching and support from both teachers and community partners.

CityWorks:

Reinventing Academic and Vocational Education through Integration

The CityWorks program at the Rindge School of Technical Arts allows ninth grade students to spend a portion of each school day actively engaged in investigating the industries, neighborhoods, systems, people, needs and resources that comprise their urban community. Working on individual and group projects, they bring aspects of the community into the classroom by creating numerous "artifacts"— three dimensional maps and models, photographic essays, brochures, video tapes and oral histories. These projects extend into the study of humanities, as students read and discuss texts related to their investigations and write about their experiences and ideas.

Several features make this program unusual. First, CityWorks combines key characteristics of vocational programs— a project approach, apprentice-master relationships and real clients— with the broader content and essential skills of academic education. Projects involve "hands-on" work, like making a wall-sized map of the city and wiring it to light up selected landmarks. At the same time, students engage in problem-solving, like deciding where on the map to locate a new teen center that would attract youth from all ethnic and racial communities of the city.

Secondly, CityWorks is taught in a space designed for collaborative project work. Looking for an alternative to both shops and classrooms, we borrowed the notion of "studios" from design schools. There is an open area at one end of the room for large-group activities such as demonstrations and exhibitions, but most of the room is subdivided into studios where teachers work on projects with small groups of students. This arrangement gives participants the flexibility to team up, or borrow tools as the project necessitates.

Thirdly, community representatives are invited to help create a context for students' efforts. Staff members from city agencies and programs identify unmet community needs that students might address and also serve as an authentic audience for students' finished products and presentations.

An overall goal of CityWorks is to help students understand their community and its needs, and ultimately to see themselves as people who can affect that community and create new opportunities for themselves and others who live or work there. Through the lens of community development, students arrive at a very different and more positive vision of what it means to be a vocational student. The point is not just to make things, learn some skills and get a job, but rather to become thinkers and solvers of problems, who work well together in teams and communicate well with various audiences.

Because many students entering Rindge are reluctant writers, emphasis is also placed on giving them new ways to relate to the task of writing. The approach is two-pronged: "Write it down" and "Write it up." Students learn the habit and value of reflection and thinking on paper through keeping journals and work logs (write it down) and they also

learn what's involved in preparing their writings for public presentation (write it up). The work logs students keep in CityWorks can also be brought to a related humanities class if they want to "write up" any of the entries in more finished form for either exhibition or inclusion in a final portfolio.

Many students also enter high school already phobic about mathematics. "I'm not good at math" is a frequently heard comment. CityWorks includes a number of math applications that are challenging and engaging for students—and entirely different from the textbook math they have come to reject. From an early project of constructing their own portfolio to later model-building projects, students learn the value of precise measurements and build their facility with decimals and fractions. The process of designing and constructing scale models of proposed buildings and services in the city involves students in using ratios and proportion. Students learn that their difficulties with such topics in math class can be overcome in the process of using the skills on a project that matters to them.

Working Well with Hands and Minds: *CityWorks Skills*

1. Problem Solving.

The ability to think through and test out alternative solutions to a problem is important in school and in the workplace.

2. Working as a team.

A good team works together to combine each player's skills to insure a good performance. Team members show each other mutual respect.

3. Communicating.

Being able to communicate ideas and information to fellow workers and employers is essential in the workplace. Information can be communicated in many different ways such as: writing, drawing, interviewing, and presentation.

4. Knowing "all aspects" of an industry.

Production skills are only part of what is involved in industry. In addition to technical skills, it's important to understand about planning, management, finance, safety, labor, and community issues.

5. Using math on the job.

Doing careful and accurate work in any industry requires an understanding of measurement systems and basic math.

6. Knowing the community's resources and needs.

As students and workers in the community, it is important to know about the city's neighborhoods, residents, and industries, what they can offer, and what you can offer them.

7. Producing high quality work.

Working carefully to produce high quality work lets you take pride in what you have done. Keeping accurate portfolio records of the work you do allows a teacher or employer to see first hand the skills which you have developed.

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CityWorks:

Course Summary

The CityWorks year is organized around the following large thematic modules:

1. **Hands and Minds**
   An introduction to important communication, technical and academic mic skills needed for the workplace.

2. **WalkAbout Cambridge**
   An investigation of the neighborhood surrounding the high school.

3. **Teen Visions for Cambridge**
   The creation of new buildings and services to be located in the city, based on a student-produced assessment of community needs.

4. **Putting It All Together/Portfolio Review/Transitions**
   Assemble and review of final portfolio including student resume and samples of best process work. Forge early "preview" connection between work in CityWorks and what will follow in the next year's Pathways and Tech Ed courses.

Curriculum Outline

Within these modules, students cycle through ten broad curriculum units:

Hands & Minds

1. Working Well As a Team
   (1 - 1/2 Wks)

Cooperative Learning Activities and team building games which include group process skill building and an orienteering activity that takes place on school grounds.

2. Learning Problem Solving Skills
   (1 week)

New Tool or Utensil Design Project in which students follow a step-by-step process to create new designs for either a tool or utensil of their choice. Students can build a model of their designs using modeling clay or cardboard. They will prepare short written presentations about their product design.

Portfolio Making Activity
(2 Weeks)

Students design and build their own portfolios using cardboard, decorative paper and other media. They then create a portfolio entry, which chronicles how they made their portfolio and includes diagrams, photos, and a written description of the design/build process. Students meet with their "portfolio advisors" to discuss the purpose of their portfolios and the expectations about them.

3. Producing High Quality Work
   (1 Week)

Studio Ownership Project in which students customize their studios through painting, building, and decorating activities (i.e. painting tables, making studio number signs, designing group logos and identities, making rule signs, etc. . .). Students can also bring in things from home to make the studio feel more "homey". At the end of the week each group will hold an "open house" in their studio for the rest of the group to see. Students will also complete a journal entry about the experience.

WalkAbout

4. Knowing Community Resources and Needs (5-6 Weeks)

WalkAbout Cambridge serves as an introduction to community development and needs assessment. Visitors from the Community Development Office present basic development practices and introduce community development themes such as: housing; transportation; social services; the environment; business; employment; new development; parks andrecreation; tourism; etc.. Broader questions are introduced such as: Who can afford to live in Cambridge? Why do so many new immigrants come to Cambridge? Does Cambridge benefit from having Harvard University? Why do businesses come and go? What are the city's greatest needs? Studio groups choose a theme, and then select a building or site to visit where they can collect first-hand information about that theme, through observations, interviews, and video documentation. Their work culminates in the development of a presentation board summarizing their findings.

5. Cambridge: Present and Future Visions (3 Weeks)

Students work individually to build scale models of existing or new landmarks which relate to Cambridge and to at least one of the Community Development themes introduced in the last unit. If they prefer they may develop ideas (and models) for a new business or service to be located in Cambridge.

Teen Visions for Cambridge

6. Community Development Project (10 Weeks)

Each year, the staff and students pick a different focus for the community development project. The goal is to identify a project that relates to existing community organizations and initiatives. Thus one year the project was to help a tourism agency plan for a Cambridge heritage museum; in several other years, the community development project focused on different neighborhoods of the city in the throes of revitalization and redevelopment efforts. The projects involve a mixture of simulation (e.g. designs for and models of new buildings) and products with an immediate use (e.g. tee shirts and brochures).

7. Community Exhibition (2 Weeks)

At the end of each of the community development projects, the students prepare a formal presentation of their work to a panel of experts, including the director of community development for the city, local school board and city council members, staff from city agencies, architects, designers, and community activists. The panel responds to the work, asking students questions about what they have done and offering suggestions as to how to move forward with the effort. In the evening, the school hosts an exhibition of the students' work for family and friends. Both of these audiences are vitally important, helping to "up the ante" on quality.

Putting It All Together

8. Portfolios (3 Weeks)

Students complete course and self-evaluations, compile portfolios, resumes and statements of purpose in preparation for next year's work in the Pathways course.

9. Egg Olympics Project (3 Weeks)

Students devise Egg Drop and Egg Crash containers for a competitive event. A "budgeting" system awards students a limited amount of CityWorks Dollars from which they can rent eggs (you-break-it, you-buy-it) as well as buy materials for their test and final designs. The notion of limited resources for development requires students to bring a level of "real world" practicality to the exercise, along with the expected measure of problemsolving skill and creativity.

10. Tech Ed and/or Career Pathways Project (4 Weeks)

Working with students and teachers from these two 10th grade core RSTA courses, CityWorks students are briefly introduced to the standards and methods of the courses while completing a small group project. (See details on Pathways and Tech Ed in later sections of this book).

Support Issues: Making it Work - Design Teams, Studio Groups and Community Representatives

CityWorks has been a course over four years in the making. Much of its evolutionary process has been a direct result of initiatives undertaken in the weekly design team meetings of vocational and academic teachers (who are the group leaders/instructors of the course), RSTA's Curriculum Coordinator, and the CityWorks Program Director. Creating a time and place for these teachers to do the actual work of integration is vital to the success of the program. Because these meetings are such an integral part of the CityWorks program, time is built into each participating teacher's school day schedule to allow the weekly development meetings to take place during school hours.

Another important feature of the CityWorks program is its low student-teacher ratios. While a section of CityWorks might average as many as thirty-two students, as many as four adults will be assigned to work with those students in studio groups of no more than eight students per teacher. These ratios are possible because Larry Rosenstock, the Executive Director of RSTA, made the decision early on to shut down the old model of delivering vocational education to freshmen via shop exploratories. Instead of spending several periods each day in the isolation of their own shops, with different students rotating through every few weeks, teachers now work together in CityWorks, forming relationships with students for the whole year.

The necessity of moving away from a large class atmosphere into more intimate studio "teams" or "groups" cannot be underscored enough in relation to CityWorks' success. CityWorks is after all, a course that has been specifically designed to emulate actual working environments, where small "teams" of professionals are involved in tackling problems and inventing solutions together. The development of teamwork skills, a greater sense of responsibility for project outcomes, and the pride, ownership and investment that come with membership in a CityWorks studio, are some of the payoffs of this small-group learning model.

The physical space where the course is taught also reflects work settings in which small teams work together with the tools they need to do the job well. Ideally, small studio spaces should be available as permanent work environments for the teams. Team members should be encouraged to take ownership of their space, organizing and decorating it in a way that is agreed upon by the group. The idea that the studio is a work space for team projects should be emphasized. Additional large-group exhibition space is also needed where teams can display and present their work to each other and to members of the outside community.

A final key feature of CityWorks success is the interest and involvement of business and community development professionals in the students' work and the program as a whole. Project advi-

sors and evaluators from throughout the city of Cambridge are regular visitors to the CityWorks studios. These professionals discuss community needs with students, offer guidance on the creation of their community development project ideas, and serve on evaluation committees when projects are presented at community-wide exhibitions each spring. These outside professionals bring a necessary "realism" to the work being undertaken by the students, making the CityWorks experience a much more authentic one than that which takes place within the more traditional high school classroom setting. In fact, the strong community link has even made it possible for some particularly strong student projects relating to tourism to find their way into the packets of handouts given by the tourist board to the thousands of visitors who come to the city of Cambridge every year.

Other Strategy #1 Courses Developed Under VIA:

Pathways

Pathways: Job Shadowing

Pathways is a year-long core course requirement for 10th grade students at the Rindge School of Technical Arts. The community development focus of the ninth grade shifts somewhat to a more career-focused curriculum in the 10th grade. Like CityWorks, the course emphasizes real world projects and connections, and it reinforces the skills of project-doing and on-site investigation. This time however, work issues, rather than community needs provide the context for the learning.

We created the Pathways program for our tenth graders in order to help them discover more about their own interests, and how these interests might connect to careers. The pathways program is designed to address the needs of urban youth for more work-centered, and hence more motivating learning experiences. Pathways is about helping students feel purposeful and powerful. By offering an experiential curriculum through which each student explores the world of work and expresses his/her own talents, Pathways enables students to carve their own path and to discover meaning in their learning.

The Pathways Program:

Rotates students through workplace experiences (job shadows) that give meaning and focus to their classroom learning.

Teaches students how to obtain reliable and relevant career information.

Connects students with adults who can help them learn about work, its relation to schooling, and the skills different careers require.

Engages students in classroom projects that call upon them to relate academic skills to demands of the workplace.

Involves students in reflecting on the value and meaning of work in their lives.

Pathways offers students two distinct but complementary methods of learning: school experiences in which students develop and use academic skills to carry out classroom projects that simulate career demands; and job shadows in which individual students carry out research on particular careers and then shadow individuals in those careers in the Boston area.

The program is divided into four curricular units or pathways: Business & Entrepreneurship, Industrial Technology & Engineering, Health & Human Services, and Arts & Communications. Within each of

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these specific pathways, classroom lesson plans combine with workplace visits to provide students with a context for learning skills and exploring careers.

Individual Pathways students visit a minimum of four workplaces— one each during their study of the four topic area pathways. Each quarter of the year, students hear from a panel of adults from the workplaces offering shadowing opportunities that term. They then select the workplaces that sound interesting to them, and spend three or four hours at the site in the company of an adult who works there. Whenever possible, Pathways places students in stimulating workplace environments, such as an emergency room at the Brigham and Women's Hospital, the cockpit of a US Air DC-10, and the trading floor of the Boston Stock Exchange. Although each job shadow only lasts for about 3 hours, it becomes the focal point of a great many other activities.

To prepare for their shadowing experiences, students do preliminary research about the types of career(s) that they will observe (they usually make use of the career resource center in the school, or the public library next door). Based on this information, they come up with a list of questions to ask at the site. Before going out, students have to verify the appointment through a phone call to the work site, have their parents approve a transportation plan (students go on their own to the job shadow) and get permission from teachers to miss their classes for the day. After the shadow, students are expected to write a thank you note and, combining the earlier research with what they learned on site, to prepare a job shadow report.

The four individual job shadows are supplemented by at least one group field trip per pathway. This group visit is meant to change the dynamic of the students' exposures so that they also have an opportunity to learn and to share as a team— a collaborative process intended to mirror an approach to learning and training that is becoming more popular in the work world.

These out-of-school experiences are complimented by project-based work which takes place in the classroom. For example, students visiting Smith Barney did a study of the interrelationship among stocks, bonds and interest rates which they presented to their classmates, while students shadowing a Cambridge Police Officer enacted a mock trial requiring them to speak publicly, wrestle with their concepts of guilt and innocence, and apply principles of law

An example of a Pathways Class Project: The Holiday Crafts Fair. (Business & Entrepreneurship and Arts & Communications Pathways)

Students conduct research on crafts fairs and develop a business plan to present to school administrators for permission to host a crafts fair in the school building. Upon approval, they do outreach to local artists, design the booth spaces, and handle all logistical arrangements. They then do a promotional/marketing campaign, culminating in early December with the fair. They determine profits/losses and analyze the success of their venture.

Student Voices about Pathways:

I personally think that Pathways is a great program for kids who are thinking about their futures. I think this because when you go on a job shadow you start to think about whether or not that job is something you would like to do in your future. At the beginning of the school year the only thing I liked about Pathways was job shadowing, but now I feel that the in-class work has helped me improve some of my skills. For example, using the Mac Lab has helped me improve my typing skills. Writing journal entries and summaries of newspaper articles helped improve my reading and writing skills. Also, following instructions and giving directions is something I learned to do well that will be helpful to me in the future.

Sandra doAlamo, Pathways student

"I started the year thinking it was my mission to bring humanities into vocational education. Now I believe we must bring vocational methodologies into the humanities."

Rob Riordan,
Language Arts
Coordinator

INTEGRATION STRATEGY 2

STUDENTS AS PRODUCERS OF KNOWLEDGE:

Transform Existing Courses and Technical/Production Activities through an Integrated Approach and Real World Focus.

In strategy #2, our approach is to take the goal of making school work more authentic and apply it to existing academic courses within the high school. In doing this, we are very clearly recognizing the use, strength, value, and importance of the academic disciplines. However, we know that in order to improve schools, we must do more than simply create a few new courses. We must simultaneously move to transform those courses that are already in place.

In most academic courses, students have traditionally been passive consumers of subject matter knowledge. That is, students are offered a time-honored "menu" of information from which they choose to "ingest" some or all of what is offered, possibly to be used and applied in some way, at a later date. In most vocational courses students have traditionally played a more active role, learning and applying new skills, usually in the process of constructing or producing something specific. However, the skills are often narrowly defined and the products of limited use.

When vocational methodologies are brought to the academic classroom, the possibility for training students to be active producers (as well as consumers) of knowledge is great. This integrated classroom is one in which, by its very nature, the teacher does not know exactly what is going to happen. The integrated classroom gives students an opportunity to act as educational "co-constructors," pursuing academic learning in the context of identifying and solving problems that are real and that matter in the world outside of school. We are aware that students may not cover as much academic content, but, in the process of doing projects, they will uncover and discover important aspects of the discipline, as well as learn important problem-solving and thinking skills.

Global and Human Studies: Linking Disciplines and Methods

At the comprehensive Cambridge, Massachusetts high school that the Rindge School of Technical Arts (RSTA) is a part of, all ninth grade students take a year of World History or Global Studies. In RSTA we offer a humanities course called Global and Human Studies that meets the World History requirement.

While the integration of English and Social Studies curricula has been widely and successfully achieved at many high schools, it is rare to find integration between social studies and the other academic disciplines (i.e. science and math), or between social studies and vocational studies. The goal of Global and Human Studies is to maintain rigorous academic standards related to the high school's requirements in World History and English, while engaging students in projects that are multi-disciplinary.

Global and Human Studies:
Course Summary and Outline

Global and Human Studies explores people: the ways in which they interact and divide themselves into groups and larger nations; the conflicts and tensions that arise out of those groupings; and the resolutions, solutions and outcomes that are achieved through mediation and diplomacy as a means to end (or avoid) conflict.

Five essential questions frame the course:

1. What does it mean to be human?
   Wherein the generic "human being" is defined.

2. Why do humans group themselves?
   A look at important human behaviors.

3. What are the strengths and dangers of groups?
   A look at the result of human behaviors.

4. What is a nation?
   Wherein the generic "nation" is defined.

5. How can individuals maintain their own identity as members of groups and nations?
   A focus on the importance and meaning of individuality and identity in different cultures.

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These questions are woven through eight interconnected but flexible curriculum units (see below). Depending on the interests of the students in the class, the teacher selects four or five of these units and encourages students to help her develop other ones, as long as they speak to the essential questions of the course.

Selection of units for study is based largely on student/teacher interest, and on current world issues. For example, during the 1994/95 Ebola virus outbreak in Africa, student interest in a "disease unit" was particularly high. This interest was grown in part from student exposure to an avalanche of graphic television news and print stories, the release of two major Hollywood feature films and several best-selling non-fiction books.

The compelling outside factors cited had the effect of making our work in the classroom on the "disease unit" more real to the students. Teacher flexibility in regard to content coverage was a key point in making this unit a success. In essence, the teacher had to be willing to accept the notion that in a class where students are expected to be active producers of knowledge, those students must be free, to some extent, to determine the direction of course content coverage.

As the Ebola outbreak progressed, students did indeed become co-producers of the very knowledge and information contained within the unit. It is partly due to their research efforts in fact, that the extraordinarily timely contents of the unit were able to be compiled with great efficiency and completeness.

The eight interconnected units for Global and Human Studies currently are:

1. Isolation and the Development of the Individual

A study of humans raised in isolation, or outside of civilization, and a look at the shared and individual characteristics of human beings. Similarities and differences between humans and other animals are also explored.[1]

2. Biography, Autobiography and Identity Charts

Stories told and recorded about ourselves, our development and our identities. Work on this unit leads to the creation of a professional-quality resume that is included in all RSTA student work portfolios.

3. Immigration/Migration

Societal movements and cultural exchanges are explored National, ethnic, and racial self-identification, and the effects of movement on identity are also focused on.

4. Disease and Human Relationships

A look at the physical effects of grouping on human beings and the social/psychological implications of disease-based isolation, plagues, superstition, folk medicine and other "cures" are studied, as are the developments in science and technology that have led to new methods for identifying and treating disease.

5. Street Kids, Gangs and Homelessness

A study of the effects of economics and poverty, racism and prejudice, disease and substance abuse, and violence and war (in particular) on children in our society. Specifically, we look at why and how children throughout the ages and throughout time have been made homeless. We also address questions about an individual's and society's responsibility to the homeless population.

6. The Hitler Youth Movement in Nazi Germany

Using a "case study" approach, themes of national identity, (youth) power and responsibility are explored through the lens of aberrant group behavior.

[1] While the other curriculum units rotate from year to year, this particular unit is always included as the opening segment of Global and Human Studies. It is essentially the foundation piece upon which the rest of the course is built.

7. Religion, Science, Technology and Power

Students consider long-standing rivalries between scientists and theologians over the origins of man and the universe. Current arguments about the place of religion in public schools are debated, and the overall effects of technological and scientific development on religious thought are explored.

8. Economic Systems

Students compare world economic theory and practice against a background of the modern global economy. A specific emphasis is placed on the role of media and advertising in the consumer-oriented society. Also, such headline-grabbing issues as the illegal immigrant workforce, welfare reform, minimum wage and workplace standards, etc. . . are explored.

Global and Human Studies: Integration Practices

In order to create students who are producers of knowledge, it is necessary for schoolwork to have some kind of technical or production focus. Clearly, in an academic classroom, we are not talking about a curriculum of hammering nails or rewiring electrical sockets (although these activities might actually be included as part of a project being completed for an academic class). The emphasis on production in an academic class should be thought of as something that means a new product will result from the process of learning. It means learning is active, and the student is no longer simply a storage vessel for the teacher's knowledge. The expectation is that students will bring something new (and valuable) to the learning equation.

Operating within this model, it becomes quite natural (and necessary even) to cross the artificially imposed barriers that exist both within the academic disciplines, and between the academic and vocational areas. An example of the authentic and spontaneous way that this kind of integration occurs can be found in the "Street Kids" unit that is part of the Global and Human Studies curriculum:

Called Street Kids Around the World and the Biology of Homelessness, the unit engages students in a study of homelessness— an issue and topic that is familiar to anyone living in an urban environment. The academic disciplines are made immediately more "hands-on" through a culminating project that requires students to design, draw and build a prototype of an inexpensive, temporary shelter for homeless people in Cambridge. Elements of architectural design, engineering, city planning, cost analysis, (and yes), hammering nails are all brought to the fore in the completion of this one project. Social/psychological concerns related to the housing of homeless people are also explored, as are government policies and zoning laws.

Students begin the twelve week unit by exploring their personal feelings about homelessness. They then move through several case studies of street kids from the eighteenth and nineteenth centuries,

exploring the social and economic landscape of this problem in the past. Finally, they take on the cases of street children in modern times, in various countries throughout the world.

A strong science current runs through the entire "Street Kids" unit. For example, while students are reading Dickens' Oliver Twist and watching documentaries about homeless children in India, they are also exploring the effects of homelessness on both mind and body, with a close investigation of health care issues related to homeless people, and children in particular. Bodily systems and sanitation are discussed, as is the physiological impact of adverse climactic conditions, improper nutrition and substance abuse on children.

Students also complete research and writing projects meant to raise public awareness about the problems of street children around the world. Interviews done with youth workers and street kids themselves may wind up as part of a student-written article for the local paper. Photo essays may be mounted for exhibition at the high school or even at City Hall. Letters are written to state representatives. Organizing is done to bring more volunteers to work in homeless shelters, after research has been completed to both locate such shelters and find out what their needs are.

The purpose of the Street Kids unit, and, more broadly, the Global and Human Studies course, is to teach students how to use the resources, tools and knowledge available in academic and vocational disciplines, so they can produce solutions to problems that they themselves uncover through their study. By not limiting inclusion of "outside" disciplines, we enable students to realize this purpose in a much more authentic and powerful way.

Support Issues:

Making it Work - Complimentary Curriculums, Team Planning and Teaching, Double-Blocks, and Classroom Arrangement

Most teachers today are themselves products of the very same compartmentalized systems of education that we are trying to transform. They have been trained and certified as either English, social studies, math or science teachers, or they have specific expertise in one of the vocational trades or the fine arts. Occasionally teachers have duel certification or professional training in an area that is seen as complimentary to their primary certification area. Mostly these two-for-one certifications seem to wed either math with science or English with social studies. In general, however, math teachers teach math and English teachers teach English, and carpentry teachers teach carpentry—period!

Given this state of affairs, it becomes very difficult for one teacher alone to teach an integrated course like Global and Human Studies. The biology component itself is enough to overwhelm most social studies teachers. And the reverse is also true. Few biology teachers would relish the chance to explore say, nineteenth century socio-economic theory. And then there is the technical/production piece. In several of the course's units, students undertake significant design and construction projects. It is simply not feasible for a single academic teacher to handle these curriculum requirements alone. A team approach must be taken.

The first order of business for the team, is to identify who the key players are and what essential skills will be addressed through their work in the classroom. In RSTA, the ninth grade team of teachers is composed of members from each of the academic disciplines, the CityWorks director and the program's curriculum coordinator. Our coursework skill requirements are very much related to the CityWorks skills (see previous chapter on CityWorks), as CityWorks forms the centerpiece of the RSTA ninth grade program.

Within this landscape, much of the work in the RSTA ninth grade academic classes is oriented in a way that is complimentary to that in all the other classes. During team meetings, each teacher is made very much aware of what is being taught by other members of the team, and curriculum decisions are made that enable students to "pick up" on topics that are being covered in all of their other classes. Integration happens between the classrooms, not just within a single classroom.

For example, students studying what it means to be human in Global Studies, may be reading Mary Shelly's Frankenstein in the Humanities class while simultaneously studying animal classification in science, and completing a statistical analysis of world population data in math. Students regularly make connections between their work in the various classrooms, and members of the team act as support personnel for each other, particularly in the area of curriculum development.

The support engendered from the use of complimentary curricula cannot be underestimated in the success of a course like Global and Human Studies. Because the curriculum is so wide-reaching and comprehensive, in and of itself, it is absolutely essential that students have a chance to view from another angle, and debrief, their social studies work in progress, while they are completing work for their other courses. In effect, all of the academic classes in particular, act as support pieces for each other.

The piece of integration that happens within the Global Studies classroom itself is best achieved through team-teaching. Currently in RSTA, the Global Studies team is made up of a dual-certified English/social studies teacher, and a Math-certified teacher with a strong English and social studies background.

Team teaching with faculty members from different disciplines would seem a fairly obvious way to insure that some form of integration is taking place within the classroom. However, unless the teaching team creates an actual combined and integrated curriculum, it may be that classroom time is simply divided into an English and a math segment, with teachers taking turns (tag-team teaching) rather than actually integrating work. To this end, curriculum-planning time must be built into the team-teachers' schedules.

Another important factor in the success of the Global and Human Studies course is it's double-block time period. Because English and Social studies are combined for credit in this course, each class meeting is double in length. Two single blocks are scheduled to create one double-long block of time, rather than two separate shorter time blocks. These long blocks are essential for completing the project work that is such an integral part of the course. We view these long blocks in much the same way that larger blocks of time have traditionally been granted to the vocational classes with their project focus. Clearly, we cannot conduct project-oriented academic classes without a similar commitment to allowing students the in-class time necessary for completing their work.

A final note about the integrated, project-oriented, academic classroom relates to its physical layout. In the Global and Human Studies classroom, all of the individual high school student desks have been replaced by (student-constructed) work tables similar to those found in many lower-grade elementary school classrooms (where, incidentally, students tend to spend much of their day actively involved in "project work"). The work tables in our room are light and easily moved to accommodate a variety of work needs. They may be joined together to form a large conference table, separated and placed throughout the room to allow for small team project work.

organized end-to-end in a large half-rectangle facing a single front-of-the-room presenter, or laid out in some variation of traditional classroom rows.

All of these furniture plans are utilized throughout the year, depending on the class' needs on a given day. What is so appealing and necessary about the tables is that they do not inhibit students from working on large-scale projects, due to lack of space, as the individual student desks ordinarily do. The tables also promote a team feeling among the students, creating within the room an atmosphere of collegiality among all the working members of the class.

Other Strategy #2 Courses Developed Under VIA:

Times of Our Lives Productions, U.S. Immigration Through Video Production, and Culture and Design

Times of Our lives productions

The outcomes realized by bringing a problem-based and production focus to academic coursework can sometimes be achieved by bringing an academic focus (and hence credit) to an existing school production activity (which may be extracurricular). Times of Our lives Productions is an example of such a strategy.

School yearbooks are often a collection of photographs with, at most, short captions written by graduating seniors. Compilation of these books is generally left to an after-school group of interested class members, led by a faculty advisor. Because of its after school status, and its lack of academic focus, school credit is typically not awarded for production work completed by student members of the yearbook staff.

Times of Our Lives Productions grew from a recognition of the enormous learning potential available from involvement in school yearbook production activities. The full-year course calls upon students to develop and use skills relating to journalism, art, photography, historiography, personnel management, marketing, sales, advertising, and finance, in the production of an accurate pictorial and written record of their years in high school.

The yearbook project incorporates accounts of events that took place within the school, the local community and around the world, during the students' high school years. Through their project-work, students gain an understanding of how a historical record is compiled, designed, printed, preserved and presented to a wide audience. Students also gain an understanding of how a small business operates, as Time of Our Lives Productions functions as a commercial, profit-making enterprise. The course offers a hands-on approach to establishing and running a business that produces a viable, salable product, and returns a profit on the initial investment.

As the product (the school yearbook) moves through its various stages of production, students gain exposure to several aspects of print-journalism, graphic arts, and commercial printing and photographic careers. The set-up, layout, and manufacture of the product requires the use of many computer-related skills. These include both the operation of computer hardware, and the implementation of a variety of desktop publishing/printing software programs. Students are also exposed to the financial aspects of running a small business, including funding, identifying markets, creating and selling advertising, collecting money, keeping accounts and drawing up balance sheets.

In terms of academic accountability, work in this course meets the requirements for work standards set in several disciplines:

- Journalism and writing activities qualify for English department credit.
- Management activities on the financial side of the enterprise qualify for business department credit.
- Research and historiographical activities qualify for social studies department credit.
- Photography and printing activities qualify for art department credit.

One of the underlying strengths of the Times of Our Lives course is that it so naturally incorporates an integrated approach to production that authentically mirrors approaches taken in the outside, professional world.

Students participating in the course are provided a learning situation that offers them exposure to a wide variety of career-related skills related to and including:

- copywriting
- art
- layout design and printing
- typesetting
- journalism
- historiography
- graphic arts
- photography
- print sales
- advertising design and sales
- proofreading/editing
- film processing
- business management
- book keeping

Upon completion of the course, students have produced a meaningful pictorial and written record of the academic, athletic, and social experiences acquired through four years of participation in the high school and the community. This record is made available to the high school and the city of Cambridge, and can be placed on file for historical purposes as well as for use as reference and resource material. It serves as part of a communication link between the high school and the wider community, and offers a service to advertisers within the community who wish to convey their own message to the public.

U.S. Immigration Through Video Production

(A teaching unit for ESL U.S. History)

If the USA is a nation of immigrants, and if immigration provides a critical thematic lens for viewing American history, then bilingual students are ideally situated, not only to pursue that study, but also to contribute to it. For they are living now the quintessential American experience: the promise of a new world, the sense of longing for what has been left behind.

As they capture their own stories on video, students learn history by doing history. Their explorations of personal experience lead them to broad understandings of US history, as well as to the realization that they are not alone, and that their experience is a truly American experience.

Lenore Prueser, Bilingual Coordinator

A collaboration between an ESL teacher, a graphic design teacher and a video technician, the U.S. Immigration Through Video project is designed to engage ESL History students in artistically expressing their visions of their native cultures, through the medium of video. The end-product of the project is a series of videos highlighting the different cultures within the student group. These videos air on a local cable television channel.

The Immigration Through Video project serves as one unit in a thematically-taught ESL U.S. History Class.[1] Producing video is a powerful way for students to both process what they are learning and to express their feelings and opinions about what they are learning. Like any non-traditional classroom activity, video can encourage students with different learning styles, by giving them a new medium through which to explore and express themselves creatively. Using video also creates a "real" audience, allowing for more authentic and performance-based student assessment. Drawing the community of Cambridge Cable viewers into the classroom encourages students to take pride in their work because they are sharing it with a genuine audience.

Video can be a classroom "leveler." With a heterogeneous group of students, video production is an activity to which all students can contribute and at which all students can succeed. Video production allows and requires a range and a variety of skills, for students of all levels and learning styles. Video production is also important because it allows and requires students to take individual responsibility while simultaneously requiring students to work as a team toward a common goal.

In most interdisciplinary English-Social Studies classes, students are asked to perform only academic tasks, most of which involve reading and writing. By incorporating video into an academic class, a broader range of students have more opportunities to express their ideas while simultaneously practicing new technical skills.

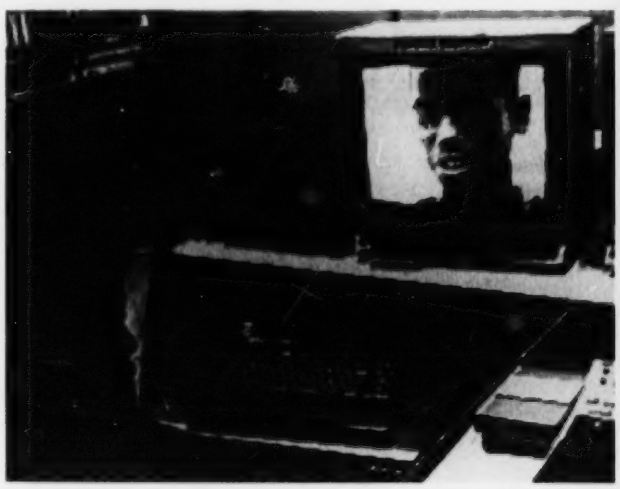
Students involved in the Immigration Through Video project learn a full range of video production skills, such as planning a program, pre-production, shooting, editing and reviewing their work. Students are able to explore creative ideas through the use of

[1] Interested students from the graphic design teacher's class participate in the project as part of their work in Graphic Arts.

new technology, and can demonstrate in both an academic and a technical way, that they have mastered the course content.

Students from a non-ESL graphic design class, as well as students from within the ESL class, work in teams, learning to operate professional-grade video cameras, and then taping U.S. History class sessions on immigration. In addition to these class sessions, student video crews tape interviews with individual students who tell the stories of their own immigration experiences. Students from the ESL class also visit the school's graphic design studio to help create the graphic design materials (based on the immigrant students' cultural artifacts), that are used for the video series. Finally, under the direction of a professional video technician, students from the ESL History and Graphic Design Groups, work to turn their videos into a television series for the local cable television channel.

While the benefits of incorporating video production work into a traditional academic class have already been discussed, the added benefits of integrating ESL students with their English-speaking peers, in a work setting, cannot be overlooked. Traditionally, students from these two groups have been isolated from each other, both physically and socially. Classes for the two groups often meet in different parts of the school building, and there is little opportunity for genuine interaction. It would appear, that if we are to create truly integrated schools, then cultural integration must be fostered along both the vocational-academic path and the human one. The U.S. Immigration Through Video Production project helps us achieve this level of full integration.



Culture and Design:
A Dream House for a Dream Land

The Rindge School of Technical Arts' Culture and Design course grew out of an architectural design teacher's recognition of the potential classroom benefit that could be gleaned from his students' widely varied cultural backgrounds. One purpose of the course is to help students understand how designers' individual cultural identities influence the buildings they design. Through detailed examination of building technologies, choices of building and finish materials, design relationships between indoor and outdoor space, the size and type of spaces provided for in buildings, the general aesthetics of buildings, uses of color, etc. . . . students begin to understand that design does not happen in a vacuum. It is heavily influenced by factors such as prevailing social and cultural traditions, available technology and materials, climate and topography, practical building usage, and contemporary notions of what is aesthetically beautiful.

The students in Culture and Design study themselves and their own cultural backgrounds as a means to understanding the many cultural factors that influence and help shape the designs they create. They also explore the history and traditions of architectural design throughout the world, looking at finished buildings against the background of cultural traditions and technologies of the people who created and built the structures. In essence, Culture and Design students undertake an in-depth study of architectural design through a social/cultural lens.

The Culture and Design course is organized around five key design factors:

1. **Tradition and Aesthetics**
   Students discuss human needs and collective value systems, and historical standards of beauty in the built environment.

2. **Structural & Material Technology**
   Students explore physics and engineering concepts related to how buildings stand up and fall down. Also, indigenous materials and technologies used in building construction, and comparisons between buildings and the human body (structural analysis) are explored.

3. **Climate & Shelter**
   Students focus on the ways shelter protects us from the elements, comparing building types in various climate zones, and evaluating strategies for energy efficient design in traditional architecture.

4. **Elements of Good Housing Design**
   The "do's and don'ts" of efficient layout and circulation are discussed, along with ideas about public and private domains, the effects of color, light and texture on design, and traditional and modern influences in design.

5. **The Design Process**
   Students explore the notion of drawing as a language. They also cover such concrete skill areas as concept development, schematic design, building design models, and project presentation.

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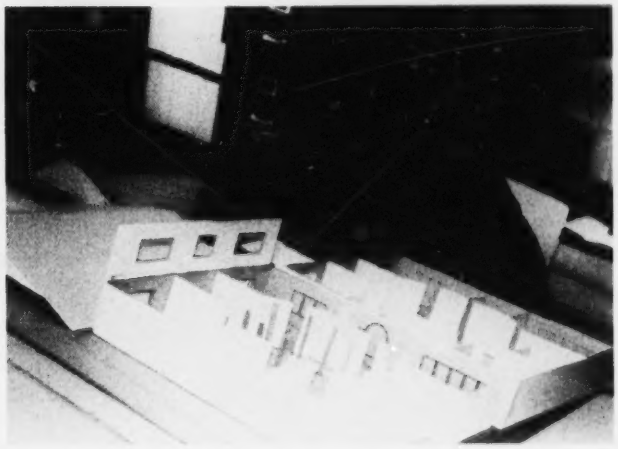
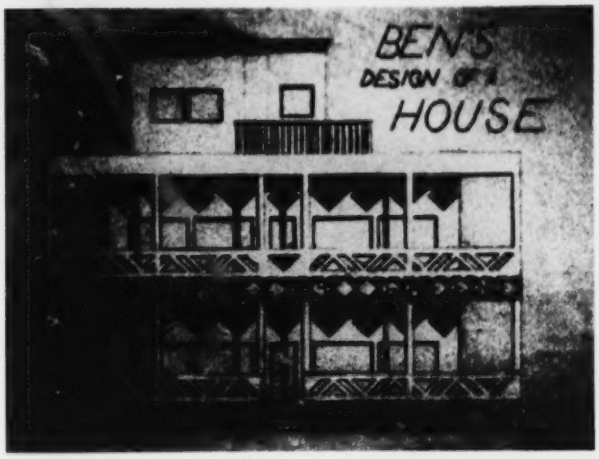
The course begins with a brief overview of the above-listed design factors. Then, after choosing a particular culture on which to focus, students create a "culture collage" in which they combine Xeroxed and drawn visual images with words, in order to paint a picture of their chosen culture. Information is gathered about traditional values, daily life, climate and terrain, structural and material technology, existing architecture, individual and community identity, standard of living, and local use of color. The collage work is combined with a broad historical exploration which focuses on how the built environment has been influenced by all of these elements within distinct periods of architectural history.

Next, students get into some of the nuts and bolts (literally) of what it takes to put a building together. They review some basic principles about the forces of structure, the components of a building, and the use of building materials as they relate to culture, climate, and technological development. Hands-on exercises which employ the use of straws, cardboard and other simple materials are utilized to illustrate the principles of force. The development of modern building materials and structural systems are also discussed. Climactic influences are introduced within the context of the earth's three main climate zones: hot and dry; hot and humid; and cold and wet. Examples of building types throughout the world are used to illustrate the effect that climate has on the form a building takes.





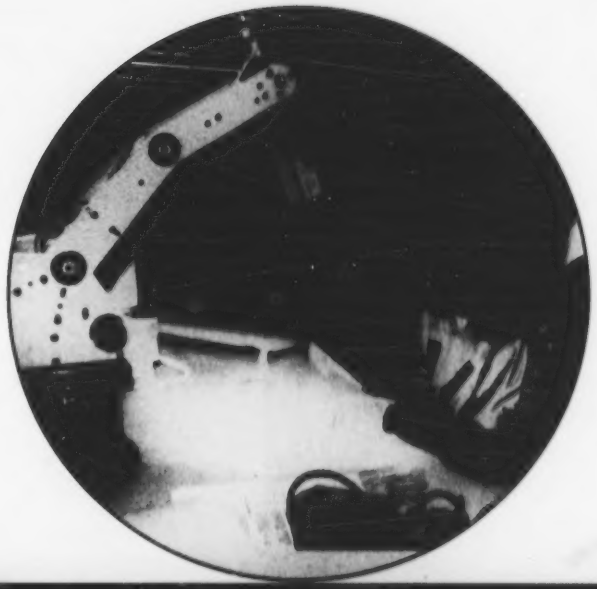
Finally, students learn about the design process which will enable them to take a design idea and move it from the initial concept stage, through schematic and design development, to final presentation. The various phases of this process are introduced, modeled, and practiced by the students before they begin to design their own "dream" houses.

Each student locates their dream house in a particular area of the world, of their own choosing. This might be the country which they, or their family is from, or simply a culture they have an interest in. Their dream house designs should show that they have developed an integrated understanding of the cultural, climactic, and technical factors that would influence the builders of a house constructed in their chosen part of the world. For those who have a particular interest in architectural history, houses may be designed to fit within a chosen historical period as well.

(31)

"The beauty of the shop experience for many students is that it's kinetic, it's real, and it's of the adult world."

Larry Rosenstock.



3

INTEGRATION STRATEGY

BUILDING TRANSFERABLE SKILLS

Transforming Traditional Shops into Integrated Centers of Technology-Based Projects, Products, and Services

Vocational education has suffered in the past because of its occupational specificity and narrowly-defined "shop" environment, and because the occupations that it has trained students for required little or no education beyond high school. State competency requirements for training in the vocational areas led teachers to define their roles in terms of moving students through a discrete series of technical tasks. Most students graduating from such programs never spent even one day working in the trade area for which they had been trained. Consequently, the long-term benefit of the skills acquired during years spent working in the school shops was questionable at best.

Since the passage of the Carl Perkins Act, the emphasis has shifted. Vocational curricula are now to include knowledge of and experience in all aspects of an industry. The intent of this legislation is for students to learn transferable skills that are necessary for success in both work and academic worlds. This has been a difficult transition for many vocational programs. VIA Strategy 3 builds on the strengths of vocational programs while also transforming vocational shops into centers for technology-based projects, products and services.

The goals of Strategy 3 are threefold:

1. To allow students to spend time productively in the shops, whether or not they will ever go to work in the shop's specific trade area.

By turning shops into broad-based production centers, students can be taught useful problem-solving skills that will serve them in a wide range of occupations. In addition, students actively engaged in "real" production activities will tend to view their efforts in the shop as useful to them in the long term, rather than simply as vocational training for its own sake.

2. To redefine the trades in technologically appropriate (but broader) ways, as a strategy for teaching transferable skills.

In making school shop work more suited to the modern workplace it becomes necessary to explore the wider uses of current shop technologies. The thinking, work, and skills used in the shop must be made transferable to both the academic and the other trade areas.

3. To contextualize vocational work without training students for specific occupations.

As a means of addressing current rapid shifts in occupations and technology, shops must become places where the trades are presented within the wider frame of project-work itself. That is, trade-related work must be placed into a context of production or project-oriented work in general, rather than set aside as part of a narrow skill that is prone to rapid obsolescence.

In recognizing these goals, one overall object stands out: Vocational shops must be made to produce useful products, through whose production, competent and creative student thinkers and producers can be born.

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Image Center:

The Print Shop as an Integrated, All-Aspects Production Facility

In the traditional Print Shop, vocational students learned how to set type, design a page, develop film, strip a negative, make an offset plate, run a small press, choose, cut, load and print paper. They also printed cards and envelopes. They punched, stitched, stapled and glued, and made use of certain hand and power tools. Occasionally the printing teacher branched out and taught photo silk-screening. The shop produced record forms and stationary for the school, and if time was available, students made pads with their names on them.

These skills prepared students for entry-level jobs in the printing trade. However, the majority of the students never again made use of these skills. In contrast, RSTA's Image Center is focused on helping students to develop technological and design skills that will be useful to them in further learning and in whatever careers they enter. In today's complex world, it is a tremendous benefit to know how to present ideas powerfully, using a range of tools and technologies.

In RSTA's Image Center, students learn the new digital technologies and design processes involved in image production today. In the process, they also master traditional tools and processes, such as silk-screening and book-binding. In their time in the Image Center, students engage both in individual and group projects. For individual projects, students are encouraged to relate their image-making abilities to other school courses and activities. For example, one student may design a cover for a history research report and bind it in a special way. Another student may create an original computer illustration for a story that was written in English class. Still another student may be creating a three dimensional graphic image for a calculus assignment or an illustration for science.

Examples of integrated group projects include:

1. The Importance of Color in Our Lives

Graphics • History • Language Arts • Mathematics • Building Trades • Science • Art History

An exploration into the uses and effects of color. The history of paints, technological revolutions in the paint and dye industries, scientific and mathematical principles related to color and the chemical compounds found in paints and dye, the general subject of color, and related advertising and marketing principles connected to its use, are all pieces of this integrated curriculum unit.

2. Visions of Power and Stability in Government and Our Lives

Graphics • History • Language Arts • Mathematics • Architecture • Building Trades • Science • Art History

By examining the pervasive use of classical and neoclassical motifs in government buildings, domestic buildings in the United States, and the former colonies of various nations, teachers and students discover the constantly recurring themes of power, perceived power, oppression and liberation that these motifs have come to represent. Students draw, build models, paint and complete a computer-morphing project related to an important existing monument or government building. National symbols and mottos are also examined.

A variety of models and projects related to several disciplines result from work completed in these two units alone. Curriculum proposals for other integrated Image Center units are regularly developed.[1]

[1] See U.S. Immigration Through Video Production project detailed in chapter two of this manual.

Image Center: An Open Lab Model

In addition to specific course offerings, the Image Center is open on a drop-in (space-available) basis for use by all school students and faculty. Essentially, the Image Center is always in session. Students are free to come in and apply their graphics skills to projects from other classes. Humanities, math and science teachers make use of the center, developing projects of mutual interest to students in a variety of disciplines. Ideally, this is a lab where student and teacher ideas can be pulled together to form interactive proposals, projects, products, solutions, etc. . .

Along these lines have come the development of Graphics Study Project Proposals, where students assigned to study hall may arrange to work on specifically outlined graphics' projects during unscheduled time-blocks. Also in place are posted project ideas meant to encourage the creation and implementation of integrated curriculum units by teachers outside of the graphic area. Outreach work is done by the Image Center teacher-director, to forge connections with other academic teachers, as a way of encouraging integration.

Support Issues:

Making it Work - Staffing, Equipment and Supplies, Outreach Workshops

In order to create an Image Center that operates at full speed, a variety of issues must be addressed. The first of these deals with staffing. Specifically, the center requires two separate staff member positions in order to function at peek capacity:

1. The Teacher/Director is a competent teacher, well versed not only in the technical aspects of imaging (computers, computer peripherals, production tools, multimedia tools, and art tools), but also one who can reach out, understand and make connections with staff members in the other disciplines of the school (i.e. science, math, history, health, art, music, drama, literature, languages, etc. . .). An imaging lab with resources, but lacking a person with integrated vision, will likely not be terribly effective at bridging the gap between disciplines.

2. The Technician/Monitor is a staff member assigned to the Image Center, who has a particular expertise in solving equipment problems and keeping equipment in top running order. This person's primary task is to manage equipment issues so that the teacher's time can be spent on creative problem solving and graphics production. The Technician/Monitor's duties may also include providing interested students with equipment repair and maintenance instruction.

Assuming this level of staffing is available, it should be possible to keep the Image Center open for student and teacher use during the full school day, and even well into the after-school hours. In relation to scheduling, it should be noted that any time conflicting staff schedules require the Image Center's doors to be locked, student production work is effectively halted. Appropriate monitoring

staff must be available and present whenever students are working because of the expensive and potentially dangerous nature of the tools and equipment contained within the center.

Ample and well maintained equipment and supplies are of course vital to the success of the Image Center program. The center's needs however require that in maintaining adequate materials' levels, the center's suppliers take into account those teachers and students who will use the center while not being formally scheduled into a class there. Supplies may become quickly depleted if these additional users are not counted when materials and supplies are ordered. And, while it might appear that formally-scheduled graphics students ought to be counted first in being assigned to use the most "choice" materials, in actuality, all materials and equipment in the Image Center are meant to be shared, on an equal basis, by everyone who elects to work there.

A final point necessary for creating an interdisciplinary Image Center relates to the outreach work to be undertaken by the center's main Teacher-Director. At the very least, a series of workshops outlining the center's uses and potential, for outside teachers unfamiliar with its offerings, is required. Beyond this, curriculum meetings with teachers from a variety of disciplines (both academic and technical) will help ensure the widest possible usage of the center's resources.

Most teachers outside of the graphics area will need some help in imagining and creating integrated units or projects that "fit" with graphics. Fortunately, in addition to the Image Center's outreach person, graphics' students who use the center on a regular basis can play an enormously valuable role in devising integrated projects. Indeed, the very process of "brainstorming" to envision such projects is a highly productive learning activity.

Other Strategy #3 Projects Developed Under VIA:

Electronic Technology Center

The RSTA electronics' shop operates as a fully-functioning "Technology Center." Under the direction of an electronics' teacher and a science professional, students participating in electronic shop programs explore a wide range of project activities meant to simulate real-world, technologically-based problems. For example, the "Weather Station" offers students an opportunity to act as actual meteorologists as they collect weather-related data and predict atmospheric conditions.

In this project, students construct and operate a professional-grade weather station. An antennae constructed and set up by students on the roof of the school building, picks up signals from weather satellites that are relayed to the station's computer's (loaded with appropriate weather-tracking software). Students collect weather data (i.e. outside and inside temperatures, wind direction, wind chill, etc. . .) from the system on a daily basis. This data is then analyzed by the student meteorologists as they produce their weather newsletters.

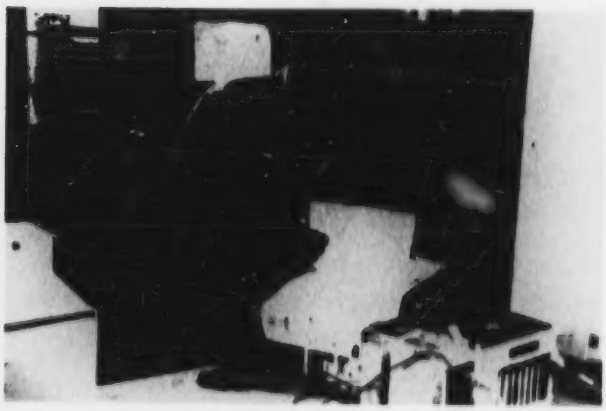
In order to become more knowledgeable about weather-related topics, Weather Station students view videos and complete science lab experiments related to climate and atmospheric phenomena. Using what they have learned, and their collected data, students produce a newsletter of weather facts and information for elementary school children.

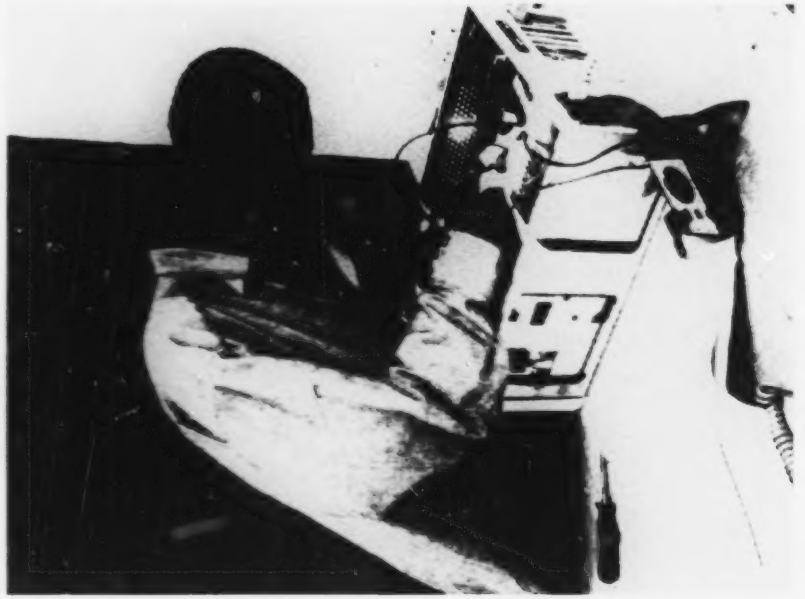
The inclusion of an outside "audience" and the elementary school "clients" in the Weather Station project, encourages a high level of quality in the finished Weather Station newsletter product. It also pushes students to aspire to faultless work in the collection and interpretation of their data. There is even some level of competition born between the project's students and professional meteorologists, to see whose weather predictions are more accurate.

In addition to the weather station, The Technology Center at RSTA's electronic shop offers learning modules related to a host of additional topic areas including:

- Computer and attendant accessories' analysis, design, manipulation and repair.
- Robotics design and applications.
- Laser technology.
- Fiber optic development and usage.
- Legos set (structural, mechanical, and electronic design and problem solving).
- Transistor-transistor logic (TTL) chip design.

The work focus in all Technology Center project areas revolves around the design and development of new technologies, and around problem solving. This emphasis is meant to afford students the greatest opportunity to transfer their shop-learned skills to their (problem-solving) work in other areas.





"Technology education means making the complex technological world approachable by young people, so that they do not have to go through life afraid and intimidated by things that they cannot imagine understanding."

Tom Hsu,
Cambridge Physics Outlet

"In the context of the science curriculum, technology education changes both what is taught and how it is taught. Classroom pedagogy becomes more "hands on"as design challenges become a central learning strategy. Course content changes as students learn about the social roles of technology, and as they learn to understand,evaluate, and use technology."

MargaretVickers,
Working To Learn Project

INTEGRATION STRATEGY 4

TECHNOLOGY EDUCATION FOR SCIENCE

Combining the Teaching of Technical Procedures with the Scientific Principles Underlying those Procedures

In traditional vocational courses students learn a great deal about how to operate equipment and machines, but they learn little about why these operations work. Shop and workplace practices are rarely explored on a scientific or technological level.

In traditional science courses, students learn a great deal about the "big ideas" of a particular scientific discipline, and about abstract scientific theory, but they learn little about how to use or do anything with their newly-acquired knowledge. Real and practical applications and uses for abstract theory rarely occur in most science courses.

Combining the teaching of technical procedures with the scientific principles underlying those procedures is the basis for a new brand of hybrid learning called "Technology Education" or "tech ed."[1] Seen as more than a means to offering vocational education students greater success in a science classroom setting, tech ed offers all students a more useful and satisfying experience in the science and math disciplines. The tech ed approach is much more likely to captivate students' minds and get them engaged in learning.

What is it?
Technology Education Defined:

In technology education, students address real world problems, ones that professional practitioners face in their daily work. The tech ed students' main tasks are: 1) to work out what is involved in addressing or solving a problem (the how to's); and 2) to understand why a solution works (i.e. what scientific principles and principles of technology lie behind the solution).

Technology education is chiefly concerned with broad concepts rather than specific competencies of technologies. Students learn to design, develop and use systems (e.g. information systems, electrical systems, mechanical systems and fluid power systems). Concern is significantly less focused on how proficient the student becomes at a certain skill, but rather is directed at his or her understanding of concepts, relationships, problem-solving, analysis and evaluation.

Technology education involves a synergistic approach: it is not a series of unrelated "projects." Teachers develop problems for students to solve, that involve the students in designing and developing systems, from simple to complex.

An example of an early tech ed design problem would be figuring out how to use a computer to control a motor. Later, students could be given the problem of introducing a mechanical component (a switch) into their newly-designed system. Finally, the problem of designing and constructing a computer-controlled system to move an object from one point to another, and documenting the results, could be added.

Technology education students work in teams, affording students at different academic and vocational levels an opportunity to work successfully together. Fully-outfitted tech ed labs provide the opportunities, materials and equipment for students to solve any technological problem they choose to address.

Technology education labs are places where students can come to experience the application of science and math knowledge. Students can also use technology labs to develop presentations and demonstrations for other classes. Eventually these labs can become learning centers for the entire school.[1]

[1] See realted discussion of the Image Center lab under integration strategy #3.

Introduction to Technology:
A Design and Problem-Solving Approach to Teaching a Project-Based Science Course

The Introduction to Technology course at the Rindge School of Technical Arts teaches students a clear problem-solving process. While there are many different descriptions and variations of this process in general, Intro to Tech's over-all sequence of problem solving tasks is as follows:

1. A human need or requirement is identified.
2. Possible ways of meeting the need are investigated and developed.
3. Information is gathered and an action plan is prepared towards producing the desired outcome.
4. The plan is implemented (Note: This is an act of engineering: Seeking practical solutions to perceived human needs or requirements).
5. The outcome (product, process, system) is evaluated with concern for adequacy and clues for further development.

As an example of this process, Intro Tech students might be challenged to design a structure capable of supporting a specified load. The students would do research into the principles of structural systems, select methods, materials and tools, and if appropriate, utilize computer assisted design (CAD) technology. Finally, they would engineer their designs, evaluate them against the previously identified need, and make further adjustments and design refinements as part of the analysis of their structural systems.

Within this design and problem-solving framework, the Intro Tech course employs a complete project-based approach to the study of science and technology. A model car design unit, for example, utilizes structural, mechanical, electrical, electronic, pneumatic and hydraulic, solar, and computer-control technological systems as a means to teach the principles of physics. As elements from each of these systems are used in the completion of the car project, the principles of physics behind the system are introduced. With great advantage being taken of the proliferation of "teachable moments" occurring during the design-build process, students learn the scientific theories related to the project. Once again, learning takes place in context.

The project-based curriculum has another enormous advantage in the Intro Tech science class: It provides students with opportunities to practice important skill sets utilized in most technology fields such as working in design teams, investigating and researching, brainstorming, webbing (also known as mind mapping, graphic organizing, and bubble diagramming), prototyping, testing, evaluating, documenting and presenting work, and using the computer (for word processing, graphing and data-basing).

Introduction to Technology:
Course Summary/Curriculum Outline

The Introduction to Technology course is organized through four quarter-long units:

1. Introduction to Measurement, Design and Technology

Students are introduced to the different technical shops and complete several small projects. These might be a mousetrap, car, windmill, or similar project that can be completed in two weeks. The goal is to get students into the design/engineering spirit of the course and to introduce them to the available resources. Long-term projects are not appropriate until the students have a sufficient successful experience base to be able to work confidently towards a project that will come to fruition only after many weeks.

2. Building on the Planet Earth

Students are introduced to building construction and engineering considered in the context of geologic and meteorological disasters. Scale models of structures are built and tested on an earthquake and hurricane simulation table designed jointly by the Boston Science Museum and the Cambridge Physics Outlet.[1] Topics for investigation include the strength of materials, trusses, bridge building, aesthetics and architecture, earth science, seismology, map-making and surveying, and others.

3. Technology in Human Environments

In this unit students learn about building technology as applied to maintaining a comfortable human environment, with careful attention paid to energy management. Topics include HVAC, energy flow, electricity and it's uses, building health issues, and temperature and human comfort levels. Student projects revolve around their evaluation of the high school building on many of these areas.

4. Aerodynamics and Vehicle Design

This unit uses the bottle rocket and a flow tank as test facilities. Students study force and fluid motion through the construction and evaluation of different scale models for vehicles that will move through water or air. Topics include air foils, streamlining, fluid motion, and design. Students finish the unit with a critique of commercial automobile, truck, or boat designs from the perspective of aerodynamic efficiency.

[1] The Woburn, Massachusetts-based Cambridge Physics Outlet (CPO), manufactures and distributes teaching and learning tools that promote a hands-on approach to the study of science and mathematics for grades 5-12.

Activities emphasized in the study of the four above-outlined units include:

- Historical research into related technological subjects.
- Site visits to view technological systems under study, in the community and/or in the school.
- Incorporation of analysis, synthesis and evalvative forms of thinking into the technological design process.
- Realization of student-planned and created designs, in prototypes and at full scale.
- Documentation and presentation of projects before an audience of peers, teachers, administrators and community-based professionals working in technology related fields.

In terms of science, the Introduction to Technology course teaches the concepts of physics (measurement, motion, structures, heat, electricity and electronics), and skills in documenting and solving practical problems in the technology lab, around the school, and in the students' larger environment. The course also teaches a design process for scientific discovery that helps students establish procedures to identify, clarify and articulate the principles inherent in their studies.

Support Issues: Making it Work -

Staffing, Department Connections, Professional Development and Lab Facilities

An important goal in the creation of the Introduction to technology course was not just to develop a course that would teach kids some science in a fun way, but also to meet the high school's (and the state's) science requirements. In order to award students science credit, the course had to fall under the science department's offerings. But, Intro to Tech is a science course taught by vocationally-certified teachers, not science-certified teachers. The issues of certification and credits were important to address.

RSTA chose a science-certified faculty member to oversee the program, and to create its curriculum. In addition to attending regular curriculum meetings with the head of the science department, this teacher/program director works with the vocational/technical staff to direct their own training in science teaching and learning. The teacher is also present during class meeting times and occasionally conducts lessons with stu-

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dents. Presently, there are four vocational/technical teachers leading student groups in Intro to Tech, working together with the science teacher/program director. The technical teachers come from the carpentry, electronics and electrical shop areas.

Introduction to Technology is not simply an errant science course that has been "allowed in" as one of the science department's "real" course offerings. It is in fact a highly-regarded academic program requiring a one year science prerequisite for entrance. Furthermore, by developing and maintaining its connection with the school's science department, the Intro to Tech program has proven influential in helping to move the school's entire science program in a more technical, project-based direction. We cannot stress enough the benefits of developing similar technical-science programs in concert with science department administrators and staff members (rather than simply with the vocational/technical staff). This type of departmental collaboration insures that Intro to Tech-type courses do not fall into the no-man's land of "elective" courses. It also helps in bringing a full range of students to the course, easing parental fears that a technical, project-based science class may not be appropriate for college-bound students.
It is important to emphasize here that the vocational-technical teachers involved in Intro to Tech do receive ongoing science teacher training. And, while they are not science-certified, they do work under the direction of the science teacher program director. They also attend regular science education-related workshops, and participate in weekly program meetings with the head science teacher. Most important, they bring a vital technical area expertise to the program, that many science-certified teachers simply do not possess.

A final support issue related to the Introduction to Technology program has to do with it's laboratory setting. In RSTA, a carpentry shop was converted to house the Technology Lab. The conversion project was extensive. Details of the conversion, with specific equipment, materials, and construction particulars will not be dealt with in this manual, although detailed information on the conversion project is available.[1] For our purposes here, it is important to note that traditional science lab or technical shop facilities may not adequately house the Intro to Tech program. Ideally, a new hybrid space containing key elements from both settings is desired in order to run the program most effectively.

[1] Please refer to Appendix I

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Other Strategy #4 Courses Developed Under VIA:

Windmills

"Windmills" is an extensive energy unit that can be incorporated into a variety of science or technical courses. The unit begins with a design problem: to develop and build an efficient windmill capable of producing enough energy to light a presentation board or a large wall map.

Students working on the windmill-design problem first complete a research investigation into how windmills work. This investigation includes dismantling and analyzing the components of a generator, running experiments with gear system apparatus, speaking with mechanical experts, and reading about windmills, gears and generators.

In the next phase of the unit, students work in teams to design and build small windmills that meet previously-detailed design specifications. Once team design models are completed, students take part in a testing, evaluating and redesign/refine process that results in the completion of a functioning finished windmill product.

The study of windmills offers students an opportunity to explore the inter-relationships between technology, energy, architecture, climate, and socio-economic development. It also helps students to begin to focus on the uses and importance of non-pollutant energy sources.

In terms of integration, the Windmills unit covers themes that relate to a number of disciplines:

1. Langvage Arts -

Students read resource works and write comparative papers. They read, write, discuss and debate issues related to cultural differences and design, and social and economic needs.

2. Social studies -

Similar to langvage arts, but also includes work on the history of windmills and geography and climate.

3. Math -

Students perform basic mathematical computation, work with measurement, fractions, algebraic and trigonometric equations, and build scale models.

4. Science -

Study revolves around work with simple and compound machines, motion, energy and engines. Electricity, pollution and alternative forms of energy are also explored.

5. Technologies -

Drafting, CAD, electronics, electrical, carpentry, computers and model making, are all used in the completing of the project.

The Windmills unit covers the above-mentioned content area concepts by offering a hands-on, design and problem-solving approach that directs students to experiment with gears, small generators, and wind-power systems. They also learn about weather and windmill farms, and their own finished models are used as a performance-based test of the principles learned.

"We need to show students that their education is relevant, and that they are relevant. That what they're learning matters, and what they can do with it matters. Then they will develop an appreciation for the true value of education, and they will graduate with more than a deep understanding of the world. They will graduate knowing they have a purposeful role in it."

John Shea, Cambridge Service Corps Teacher

INTEGRATION STRATEGY 5

DOING WELL AND DOING GOOD:

Connecting Coursework to Community Resources and Needs.

When teachers begin connecting coursework to community resources and needs, several aims can be achieved:

1. Students are able to make use of their ample (and often undervalued) stores of prior knowledge.

2. The school is able to bring new adults from the larger outside community, into the learning equation.

3. Learning in the classroom is contextualized in an immediately useful way.

4. Teachers model the socially responsible behaviors desired of citizens in a democratic society.

5. Students tap into their own desires to play a role in something that is meaningful, and of lasting value.

Taken separately, any one of these aims offers undeniable benefits in a learning environment. However, the combination of all five creates the possibility for dynamic, long-lasting learning to take place throughout the school and within the community.

Prior Knowledge

Working off of prior knowledge is always an effective teaching strategy. It allows students to be recognized for what they have already achieved and what they know, rather than having this knowledge dismissed as less important than that which will be freshly taught. When students are faced with new information that is couched in a familiar foundation, there is a much greater chance that they will embrace learning and develop beyond the point where they already are. Additionally, when the knowledge to be built upon relates to the students' own community, there is the added bonus of students' retaining a significant personal investment in what they are building or exploring. Students often know much more about their communities than their teachers are aware of, or give them credit for knowing, yet, it also true that there is much more for them to learn.

Outside Connections

The desirability of making public schools "community schools" is evident, particularly in densely-populated urban areas where the school stands

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poised to meet a variety of community needs beyond simply educating the community's young people. Part of the community school concept is the idea that the community itself must take responsibility for educating and training its future workers, members and leaders. That said, many potentially valuable resource people outside of the school, while feeling a genuine desire to "get involved," are not familiar with or comfortable negotiating (alone) the sometimes bumpy road to establishing a school connection. When a "community curriculum" is brought into the classroom, part of what is achieved is this important connection with outside resource people.

Contextualization

We have already seen in earlier integration strategy chapters how and why Contextualization of knowledge is beneficial to students. Community-oriented learning is particularly effective in helping students to see the usefulness of knowledge.

Social Responsibility

Part of the work of schools is to teach students lessons in social responsibility so that they may one day leave school and take their places as useful democratic citizens. Talking about social and community responsibility is a far cry (in terms of effectiveness) from practicing these ideals. Teachers who actively seek out and forge working connections with members of the students' own community effectively model democratic behavior for students through their actual "active" behavior. "Do as I do, and as I say" becomes the motto of the community-invested teacher, and students do tend to follow suit.

Meaning and Value

While none of the five aims outlined under integration strategy #6 is of greater importance than the others, investing student work with meaning and lasting value evidences perhaps the most dramatic effect in its impact on student achievement levels and enjoyment in learning. Students are known to regularly bemoan the lack of importance attached to much of the work they complete (or choose not to complete) for school. Finding not only academic relevance, but also true meaning and value in the tasks one engages in on a daily basis (for twelve public-school years), is the key to forming students who will be life-long learners. Yet students all too often are left feeling that school has no bearing on their lives, and that what they do there allows them no path toward making a valuable contribution to society. Connecting coursework to community resources and needs allows meaning and value to enter the classroom, thus enriching enormously the learning experience for everyone involved.

Cambridge Service Corps:
Community Problem-Solving 101

"Most of all we want to succeed in establishing a course that teaches young people a little bit about the world, and the world a little bit about young people. We want to establish a course that will prepare young people to be critical thinkers, effective activists, and aware citizens."

Mara Sanchez, CSC student - class of 1997

Aimed at pushing the extremes of what young people are capable of contributing to their community and capable of learning in the process, Cambridge's Community Service Corps (CSC) challenges high school juniors and seniors to put their heads, hands and hearts to work leading a community-wide effort to target and address critical local needs.

The learning component of the CSC centers around a rigorous experiential course, Community Problem-Solving 101, that runs the length of the school year, comprises close to half of the students' entire course load, mixes classroom studies with extensive community-based work, and is credited as a combination of social studies/civics, English/language arts, and vocational/technical arts.

At the core of the CSC curriculum is a complete a-to-z community problem solving process. Students participate in a community needs assessment, create a shared vision for the city, evaluate current health and human services, and identify critical gaps and problem areas. They produce an inventory of their own skills and abilities, conduct an investigation of available resources, and debate and decide, as a team, what particular issue to target. Working in partnership with a wide array of public, nonprofit, and private sector representatives, the students then design their own community initiative.

Leading the development and execution of this initiative (whether it be the completion of a one-time project or the creation of an ongoing program), the CSC students follow a detailed plan of action which they themselves have produced and for which they take responsibility for securing all necessary resources including volunteers, money, materials and services. Reaching out to involve their high school peers and teachers, their old elementary schools, area college students, local businesses, friends, and their families, the CSC students in effect become the organizers and directors of a large-scale community-wide effort— and they become genuine advocates for positive social change.

Social studies/civics, English/language arts, and, to a lesser degree, math and science are the fundamental academic disciplines integrated into the CSC course. The vast range of social studies and civics topics explored include: government, politics and social policy; immigration, civil rights and school desegregation; unemployment, inflation and economic development; health, welfare and education reform; and the relevance of local history to current issues.

English/language arts applications not only include numerous authentic writing opportunities such as the composition of letters, proposals, press releases, and fliers, but also include book reviews, research papers and daily journal entries. Students study relevant literature (fiction, nonfiction, classic, and contemporary), music, and art. The exploration of these creative works also serves to inspire the CSC students to create their own literary, musical, and artistic expositions.

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Math and science skills are developed and utilized in such diverse areas as statistical analysis, probability, demographics, budgets, taxes, spending, scientific investigation, biology, health, conservation, ecology, and the environment. And the study and application of practical hands-on vocational/technical arts prospectively includes (depending on specific projects undertaken) carpentry, mechanics, electronics, graphic arts, design construction, communications, and computer technologies.

Faculty expertise from throughout the high school and the community, numerous guest speakers, multimedia instruction, current events, case-method teaching, active discussion and debate, and project-based studies are among the tactics used to generate powerful cooperative learning. However, it is the extensive community-based work, utilizing Cambridge and the greater Boston area as the text, that cements student understanding and brings their studies to life.

The entire CSC curriculum is grounded in personal growth, self-understanding, community building, teamwork, and leadership development. Student imagination and creativity is channeled into entrepreneurial, critical thinking and problem solving skills. CSC students, fostered by a growing self-confidence, learn to become articulate public speakers and effective leaders. They come to understand, through direct experience and deliberate analysis, the process of team building, the value of collaboration, the power of diversity, the importance of listening, and the meaning of tolerance and respect. They explore the virtues of responsibility, caring and service, and they develop the habit of frequent and serious reflection so crucial to the learning process.

Student assessment is based on group exhibitions, the achievement of team goals, individual performance, authentic portfolios, and a personal demonstration of the knowledge, skills, and values that drive the CSC. The CSC strives to graduate students with character, a keen curiosity, a passion for exploration and discovery, a deeper understanding of their own self worth, and well-rounded preparation for success and fulfillment in work, further education, and life.

The CSC offers students the opportunity to work together— with the full support of their school district and in collaboration with the greater community— to master, integrate, and apply core academic disciplines. Practical hands-on vocational crafts, and creative problem solving skills, to achieve goals they themselves have set. The CSC also supports the dissemination of service-learning practices throughout the high school and the school district.

Beyond producing an immediate and significant impact on pressing local needs, the CSC is responsible for building a powerful force of student role models, future community leaders, and catalysts for responsible, idealistic, and active citizenship. Instilled with a deep appreciation for the true value of education— namely its creative application to positive action— the newly inspired corps of life-long learners graduates from high school with more than a better understanding of their world. They graduate knowing they have a purposeful role to play in it.

Cambridge Service Corps

Community Problem Solving 101:

Course Summary/Curriculum Outline

The year long Community Problem Solving 101 course is divided into three large (overlapping) curriculum sections:

1. Preparing to Create Social Change (September - February)
2. Taking Action & Creating Change (January - June)
3. Documenting the Year-Long Process (April - June)

Within each of these sections the following skill units are explored:

1. Preparing to Create Social Change

- Build an effective team with a common vision

  - Create a foundation of self-understanding and personal growth.
  - Come to know, respect, and celebrate one another.
  - Agree on working norms & decision making process, and commit to a shared purpose.
  - Cultivate community support and build a base of power.

- Develop Necessary Knowledge (Civic Intelligence)

  - Explore and know Cambridge (local emphasis - in a comparative context).
  - Understand the "Seven Circles of Well-Being" (i.e. social problems/issues).
  - Study the "Five Forces" (i.e. successful, failed, potential solutions).

- Develop and Refine Critical Skills

  - Skills for building and understanding / critical analysis.
  - Communication skills (including computer technology)
  - Community organizing, leadership, and action skills

- Cultivate the Passion and Untap the Will to make a Difference

2. Taking action and Creating Change

- Group selection of target issue
- Generate project/program idea
- Develop and lead community-wide initiative
- Secure feedback and evaluate results

3. Documenting the Year-Long Process

- Reflect on and learn from complete September-June experience
- Share the experience and the process with others

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Support Issues:

Making it Work - Service Center Supports, Service Networks and Academic Recognition

As members of the high school's flagship service learning organization, a major task of the CSC students and faculty is the dissemination and systematic integration of service-learning projects and curriculum throughout the high school and among the district's fifteen elementary/middle schools. In order to achieve this, the CSC classroom has been designed to function as a schoolwide community service resource center. As the school's full-time community service specialist, the CSC director/teacher needs the support and resources necessary to effectively lead these expansive efforts. Necessary support and resources include (but are not limited to) telephone, fax and computer communications equipment; access to printing and copy facilities; ample filing and display areas; and transportation/travel resources.

In addition to material supports, the CSC and its resource center must cultivate and maintain extensive collaborations with interested individuals from the larger community in order to exist and function properly. In effect, the task of the CSC is both to develop a kind of service network within the school and between the school and the community, and insure that this network grows and prospers. Toward this end, it is extremely beneficial if the CSC students can be led by a director/teacher who already has service contacts within the community. Building upon these contacts can then bring about the kind of wide-spread community support necessary for creating a thriving program.

A final support issue related to the Service Corps program has to do with achieving academic recognition from academic departments within the high school. It is too often the case that academic departments find themselves vying for each others' (student) territory. That is, Department faculty feel that they must maintain a certain level of student registration in department-offered courses in order to stay viable. A drop in student interest, some fear, may result in the dismissal of department faculty numbers. One unfortunate result of this type of interdepartmental competition is that academic department heads are sometimes reluctant to award credit in their discipline areas to courses that are taught by faculty outside the department, or that do not come under the department's heading in the school's course catalog.

It is hard to argue against the legitimacy of awarding social studies credit to a service-learning course where students are honing their skills in social analysis, data analysis, and other research methods. However, seeing their mission as teaching history (especially if that mission is reinforced by state exams), a social studies department might decide to deny credits. Where the credit issue becomes truly problematical, is when students begin to feel that the school does not recognize the importance and academic relevance of their

work in the Service Corps, and thus refuses to support their efforts. Our main task then, in relation to this issue, has been to work extensively with academic department leaders and curriculum coordinators to try to insure their continued support of the program. This "public relations" effort generally falls to the CSC director/teacher to undertake, in addition to his or her other program-related/teaching duties.

Other Strategy #5 Projects Developed under VIA:

The Community Service Learning Project

The Community Service Learning Project takes a different approach to bringing service opportunities to students. Participants in this project are actually members of existing academic classes that have been infused with a service-learning component. Students in the newly-integrated courses receive the academic credits originally offered by the class (whose primary goals and objectives remain academically-based). However, the added service dimension brings students a fuller learning experience than that offered by a traditional academic class.

Students develop and refine reading,writing, analytical, observational and professional skills through participation in community service activities relevant to their academic studies. Upon completion of a CSL course, students have gained a better understanding of their community and their potential role in it as human service providers and as citizens.

Academic courses that lend themselves particularly well to community service activities include English or social studies courses built around themes related to adolescents, law, communications and mass media, human values, immigration, groups in conflict, etc. . . Also science classes where there is a health/medicine focus are appropriate for service-learning integration.

Below are just two examples of community service and career related activities that could be integrated into existing English department courses offered at the Cambridge Rindge and Latin School:

Course # E189 - Adolescents in Literature

1. Students research and volunteer for programs that provide guidance and support for teenagers considering leaving home, quitting school, or involvement with drugs and alcohol. Service related activities include:

- Examining research and case histories, examining the goals and agenda of the service agency, and collating information on success rates of participants who have left the program.

- Developing curriculum for the adolescent program that will help effectively address the issues that participants face as adolescents. Presenting workshops, developing collections of appropriate reading materials, and making video presentations are all project examples.

2. Students research the Cambridge Teen Health Center and teen support groups. Service related activities include:

- Providing specific suggestions as to what program changes could be made that would make the program more effective, and submitting these in proposal form.

- Applying the issues these programs address to characters and issues in the books read in the English class, and determining whether these programs would have been adequate for the situations presented in the literature. Finally, putting together formal suggestions for changes in the health center and support groups, in relation to this analysis, and assisting in the implementation of these suggestions.

Course #E824 - Communication and Mass Media

1. Students volunteer at various organizations that work with or for battered women. Service related activities include:

- Drawing on their direct experience at a clinic or home for battered women, and through an exploration of how the media presents these women, students conduct an analysis of the power of the media in influencing public policy and public opinion about battered women. Further analysis might extend to an exploration of the enforcement of and changes in the laws related to this issue.

2. Students focus on fundraising and on how various non-profit organizations use the media to raise awareness and thus increase funding. Service related activities include:

- Picking a specific organization, such as a mental health clinic, The Easter Seals Society, or an organization for non-violence, and working closely with the public relations coordinator to explore how the organizations use the media and advertising to raise public awareness and support. A final project might be the creation of an awareness campaign and its implementation either at the high school or in the larger community.

These short examples offer a tiny glimpse into the curricular possibilities that integration of service learning projects into existing academic courses might offer. Development of additional ideas depends heavily on the specific academic courses taught at a particular high school, and the willingness of academic teachers to work with a Community Service Learning project director on the integration. Clearly though, this kind of service learning approach is possible (and beneficial) for students in a large number of academic classes across almost all disciplines.

The integration of community service learning into an established academic curriculum requires a very clearly defined job placement to be outlined and understood by both the student, teacher, and personnel at the placement site. It also may require slight adjustments to class hours and the re-arrangement of the syllabus and course requirements.

As initiator and organizer of the project, the CSL project director works closely with teachers to provide connections between community agencies and the school, and to help re-evaluate and re-organize curriculum so that the issues studied in class and the experiences in the community agency will most directly complement each other. Responsibility for the documentation of the project also falls to this person, therefore teachers need not view participation in the project as another huge responsibility to be added to their schedules.

"'If school work could become more like the "real work" young people willingly engage in, schools might do better at capturing the attention and allegiance of youth."

Adria Steinberg, VIA Co-Director

INTEGRATION STRATEGY 6

WORK AS CONTEXT:

Creating Opportunities for Work-Based Learning

Most young people are motivated by the idea of performing "real work" at paying jobs. Jobs loom large in the teenage mind, even though most of the jobs teenagers work involve the performance of dull repetitive tasks that the young employee soon finds boring. In addition, beyond the short initial training stage, most jobs held by teenagers offer very little opportunity for learning. Yet, in spite of these shortcomings, kids do care about their jobs. And, interestingly, students who may be irresponsible and resistant to working in the classroom are often extremely conscientious and productive in the workplace.

Creating opportunities for work-based learning allows a connection between school and job site to take place, so that the student receives the benefits of both as learning environments. Students participating in school-sponsored, work-based learning internships are engaged, open, and willing to work at their job sites, and this more "ready attitude" generally carries over into their school classroom activities.

Internships, as defined here, are not simply job sites where students go and spend a requisite number of (during school) hours working at tasks for which they possibly get paid while receiving high school credit. In order to make an internship a real opportunity for learning, the internship definition must be broadened and consist of:

1. Job placements where site personnel are involved in exploring the learning potential of the tasks performed at work, with the student intern and teachers from the school.

2. Some work on the job site that lends itself to the completion of a final culminating project (that demonstrates learning) for presentation by the intern to school and work personnel.

3. An opportunity for a significant portion of the time spent at the worksite to consist of the interns' learning new skills.

4. Placements where interns are allowed to perform tasks that contribute something of value to the workplace.

In order to be effective as vehicles for learning, school-sponsored internships must be comprised of three major components: school-based activities, work-based activities and connecting activities. When properly organized these types of internships are able to form a more coherent whole, for the student, from the previously separate experiences of school and work.

A final benefit of the internship is its success in bringing students to more advanced programs of study after high school. In the past, students participating in school-sponsored internship programs were seen as less likely to go on to college or any form of post-secondary study after graduation from high school. Recent evidence shows however, that students graduating from school after completing an internship program like that described above, enroll in college at a higher proportion than students completing any other high school course of study.[1]

[1] At the Rindge School of Technical Arts, the college-going rate for graduating internship students is 85%. This compares favorably with the 75% rate for the comprehensive high school in Cambridge as a whole, and is far ahead of the 50-60% rate for students who were once solely involved in a vocational course of study.

The RSTA Career Internship Program: Essential Elements

The Rindge School of Technical Arts offers students internship opportunities in four broad program areas:

1. Financial Services Internships
   Banking and Financial Management
2. Harvard University Internship Program
   Office Administration, Kitchen & Dining, Property Management
3. Cambridge-Lesley Careers in Education Internship Program
   Education and Teaching
4. Health Sciences Internship Program
   Medicine and Health Services

Students in the internships spend a portion of each school day working on site, under a job supervisor. Beyond this, they participate with other interns in a high school teacher-led, on site seminar, for which they receive academic credit. An additional mandatory seminar held at the high school rounds out the internship experience, for which students receive a total of forty credits.[1]

More detailed descriptions of RSTA's four internship program options follow:

Financial Services Internship Program

The Financial Services Internship is offered to Cambridge high school students as a collaboration between the high school and the Citywide Youth Employment Office. The objective of the program is to provide interns actual field experience in banking and related career areas, and to integrate the interns' work experience with classroom study.

Students in the program work, often in pairs, at local banks, credit unions, and other financial institutions while concurrently participating in a related academic seminar. The seminar curriculum, developed cooperatively by high school staff and the program's banking partners, covers humanities topics as well as growth and personal development, and all aspects of the banking/financial industry. Readings and writing selections are based around the theme of work, the monetary system, and the world of finance. Students keep daily journals, recording worksite experiences, and they complete a final project at the end of the internship year.

Students spend one half of each school day working in the Financial Services Internship Program. This time is divided daily between seminar work and job site duties. Students are paid a stipend for all internship-related activities, including time spent in the connected seminar.

[1] Regular year-long academic courses at the high school receive ten credits.

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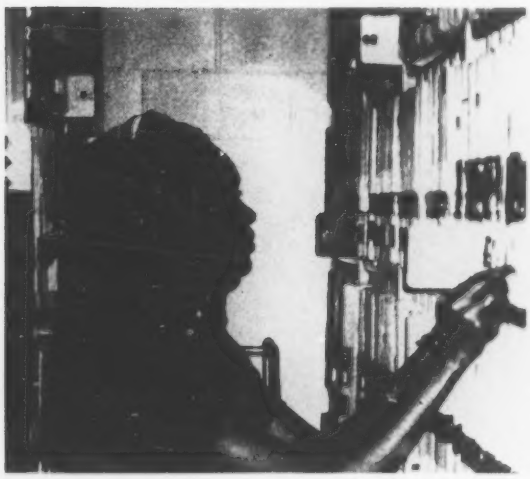
Harvard University Internship Program

Similar in structure to the Financial Services Internship, the Harvard Internship offers students the opportunity to spend one half of each school day working and learning on site at Harvard University while receiving a paid stipend. Students keep daily journals and attend a humanities seminar (for English and social studies credit) at the work site. Readings, writings and discussions revolve around issues related to work and industry (i.e. trade unions and labor law, economic structures, employee-management relations, job safety, race and gender discrimination, etc. . .).

Specific work placements offered through the Harvard Internship are varied and include the Harvard motor pool, Harvard dining services, Harvard real estate, and Harvard administrative offices. Students are assigned to a variety of tasks that may have them working with computers, doing general office work, monitoring and dispatching vehicles in a busy transportation system, catering university events, working on electrical, plumbing or carpentry projects, and/or handling general facilities maintenance problems.



Cambridge-Lesley Careers in Education

This internship program is a collaboration between Cambridge Rindge and Latin-school and Lesley College in Boston, MA. It is designed as a unique transition between the worlds of high school, college and work. It is open to all high school juniors and seniors who are interested in working with young children.

Students participating in this internship work as teacher's aides for two and a half hours, two mornings per week in a local public school kindergarten or first grade classroom. The work involves collaborating with an elementary teacher to create meaningful learning experiences for individual children, or small groups of young students. Near the end of the year, each student designs and implements a month-long education-related project with clearly defined teaching and learning goals and objectives, a research paper based on relevant professional journal readings, and a systematic method of documenting the project. The culminating activity is a presentation before a large audience that includes the superintendent of schools, all cooperating teachers, administrators of the high school, parents, and representative staff and administrators from Lesley College.

On the three mornings per week that student interns are not working at elementary schools, they participate in a seminar that focuses on early childhood development, as well as related English and social studies topics that connect the on-site experiences with these academic subjects. One objective of the seminar is to involve students in a process of meta-cognition in which they think about themselves as both learners and teachers, and may then take steps to apply what they are learning in both the high school and elementary school.

Since another goal of this program is to give students an introduction to college level work, the English class portion of the seminar is taught by a Lesley College professor who structures the course

much as she would a typical college freshman English class, with similar expectations. While this is sometimes a stretch for some of the students, considerable support services are made available to them, and the experience does prepare these high school students well for the college experience.

The Cambridge-Lesley internship program requires students to show a high level of responsibility and resourcefulness. Interns take all of their seminar courses on campus at Lesley College. They must be present at their elementary school placement sites before the children arrive, and they must meet regularly with their cooperating teachers, and keep daily site logs of their observations. They are treated professionally at their sites, and are often included in teacher conferences about individual students.

The Cambridge-Lesley Careers in Education Program creates opportunities for high school students to combine academics with real life experiences in an environment where they must be mature, reflective, analytical and creative. Rarely do students participating in the program fail to live up to these requirements and expectations.

Health Sciences Internship Program

The Health Sciences Internship Program offers students an opportunity to work in a hospital setting while concurrently doing coursework in Anatomy and Physiology and the Literature of Disease and Health. An on-site hospital Health Sciences seminar rounds out the academic portion of the program, making this perhaps the most all-inclusive (and time-intensive) of the four RSTA internship offerings.

Health Sciences interns are placed in a variety of hospital departments including: Interpreter Services; Laboratory Pathology; Orthopedics; Radiology; Pediatrics; Pharmacy; and Human Resources. Much of the work that the student interns perform is

valuable to the hospital as well as to the students themselves. For example, in the Histology/Cytology (tissues and cells) Lab, interns cover, stain and file slide samples. In Orthopedics, interns assist technicians in putting up traction beds and applying casts. In Radiology, interns register patients, schedule exams, pull x-ray jackets from the film library, observe the performance of imaging procedures, and review/critique x-ray films with quality control personnel.

Students in the Health Sciences Internship Program do not simply stand around and watch the hospital personnel perform their jobs. They become part of the health care team at the hospital, while at the same time learning about the wide range of career opportunities in the health care field. Students graduating from the program are prepared to succeed in post-secondary education in the health and medical areas, although some do realize, after completing the program, that these are no longer areas of career interest for them. Yet even these students are well prepared after their internship experience, to go on successfully to further study (in unrelated fields).

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Support Issues:

Making it Work - Internship Coordinator, Scheduling, and Interns as High School Students

In the internship program, the main conduit and most vital link between the school and the workplace is the Internship Coordinator. The Coordinator plays an essential role in managing the logistics of the internship program, and in making sure the needs of student interns, workplace managers and school personnel are being met (with respect to the internship program requirements). The Coordinator is also responsible for making information about the program available to students within the larger high school, and for continually seeking additional internship opportunities for students, so that the program's offerings can be constantly expanded. In addition to all of this, the Internship Coordinator hosts visitors from other school systems and from interested business and community representatives, who desire in depth information and "tours" of the program.

A second important element in making the internships work is the ability to schedule internship students "out of the building" for regular large blocks of the school day. Generally this can be accomplished by breaking student interns' school schedules into a morning or afternoon "internship block," and then allowing the other portion of the school day to be fitted with regular academic classes that follow the school's schedule. This type of scheduling can become difficult however when a school is operating on a full-day rotating schedule, and occasionally other scheduling arrangements may have to be made. For example, it may be necessary for student interns to divide their school year into a worksite half and a full-time classes half, meaning that for one half of the school year interns would be on-site at the workplace for the full school day, and then there would be a half year full-day of classes. Or, it may simply become necessary to schedule all or a portion of a student's worksite experience either before or after the regular school day. While this type of arrangement is certainly not ideal, it should still allow the connected academic seminar piece of the internship to be scheduled during the school day.

Obviously, scheduling specifics will vary depending on school and worksite requirements, but the key to making the internship work, in terms of scheduling, is for great flexibility and creativity to be applied to the scheduling process. Essentially, we have found that it is possible to accommodate almost any school schedule, and still have students at the worksite for some portion of the regular school day.

An often overlooked piece of the internship picture is the social needs of interns as teenage high school students. While students respond extremely well to the freedom and responsibility that come with an off campus placement, some also feel a loss at not being "regular high school kids" anymore. They may for example, not be on campus during the school's regular morning announcement and homeroom period, because they are at their worksites. This can result in students feeling "out of the loop" with respect to school social activities like dances and yearbook picture taking, etc. . . Internship students may also have less opportunity to participate in after school activities and sports, because of a possible extra time commitment necessary for the completion of their internship work. Or, students may simply not be able to take part in some of the regular school day social activities like the lunch period, because they are off campus during this time.

Clearly, there are choices to be made if a student is interested in taking part in an internship. Still, every effort should be made by school personnel to insure that internship students are not left out of the important social experiences of high school, simply because they are off campus for a portion of the school day.

"I can't even begin to list the many things that I learned from doing this. I learned to listen to ideas, to come up with ideas, to work individually and as part of a team, to speak in front of a large group of people, to teach people about something that can benefit them, to work under pressure, to organize, to help prepare a workshop, but most important of all, I learned that for something that seemed so far-fetched at the beginning, and turned more than possible at the end, in this world, anything can be done."

Melissa Guillen,
Senior Project
Student

INTEGRATION STRATEGY 7

SELF-DETERMINED LEARNING:

Involve Students in Developing Independent Projects that Have Lasting Value Beyond the Classroom and Culminate in an Assessment by Outside Experts

In this chapter we will break with the format followed throughout the preceding chapters of the VIA Manual, in order to show the process of implementation for Integration Strategy #7. For this strategy, which deals with student self-determined learning, we have chosen to highlight the Senior Projects Program begun at Cambridge Rindge and Latin School, under the VIA grant, in September 1995.

What follows is a detailed Study Group Report submitted to the Cambridge, Massachusetts School Department by VIA co-director Adria Steinberg in June 1996. The report recounts the steps taken toward implementation of Senior Projects at the high school, the activities of students involved in the program, important milestones and target dates related to the completion of student work, and overall reflections on the entire process.

Study Group Report

Submitted by: Adria Steinberg, June 1996

Background

In September of 1995, a group of administrators and teachers began meeting to discuss the feasibility of giving seniors at Cambridge Rindge and Latin School the opportunity to participate in doing a Senior Project. As a process that combines student-centered inquiry and research with the development of product(s) that are shared with an authentic audience, the Senior Project seemed like an ideal culmination of four years of high school. We felt that this type of experience would be of vital importance to students as they prepared for the transition to life after high school—and the various combinations of work and learning in which they might find themselves.

Nationally, over one-half of the students who begin college do not complete it within a six year period. The majority of those who leave do so within the first six months. Although we do not have good follow-up data on graduates from CRLS, many of us fear that our students are no exception, that the college-going plans of June turn into a search for full-time employment by January.

Several of us on the Senior Project committee had been involved in the development of the CRLS school-to-career internships. We had experienced first-hand how valuable it was for students to carry out major projects, using the worksite as a context for their investigations, relying on a seminar of their peers as a support network, and using their supervisors as the audience for the presentation of their work. We wondered if it would be possible to replicate important aspects of this experience outside of the context of a school-to-career program.

We had seen from our internship programs that work settings provide a context for students to practice and develop "learning to learn" skills in such vital areas as information gathering and analysis, problem posing and solving, data analysis, report writing, and oral presentation. Although many of us at CRLS believe in the importance of such skills, traditionally structured classrooms simply do not afford enough opportunities for modeling and teaching them. The senior project seemed like an ideal vehicle for reinforcing such skills.

In writing about the graduation portfolio process at the highly acclaimed Central Park East Secondary School in NYC, Linda Darling Hammond and Jacqueline Ancess, articulate the tremendous value to young people of delving deeply into issues that they care about and then sharing that work with others: "Being told by respected colleagues precisely why and how one's work is interesting, valued, and understood is a confidence-building and competence-building experience for any of us, and one most teenagers rarely encounter."

We also saw the value of Senior Projects as a form of alternative assessment. As Theodore Sizer of the Coalition of Essential Schools has written, exhibitions such as the Senior Project "elicits proof both of the student's understanding and of some imaginative capability—it serves at once as evaluative agent and expressive tool."

We decided to meet on a weekly basis, setting ourselves the challenge of designing a senior project experience that would make use of the best feature of the internship projects and yet be available to any student in the high school. When the Massachusetts Department of Education offered a request for proposals for district study group grants, we saw this as the perfect opportunity to intensify our work.

Rather than spending the 1995—96 school year planning how to implement CRLS Senior Projects in the Fall of 1996, we decided to engage in a form of "action research"—piloting CRLS Senior Projects as we continued to design them, using what we learned to revise and modify our plans. Perhaps the simplest way to describe this is as a "Ready, Fire, Aim." approach to program design.

Study Group Activities/Process

Once we were assured of a study group grant, we began the process of letting seniors know that they could elect to do a Senior Project during the second semester of the 1995-96 school year. We held our first meeting with interested seniors in mid-December. The action phase of our study group had begun. From early January through late May, the study group met at least once each week. After an initial "hunting and gathering" effort, to find materials developed by other schools, we began to design the materials for students, mentors, seminar leaders and panelists. We also used our meetings to assess how things were going and to make necessary adjustments in our plan.

The study group meetings were vital to keeping us on track throughout the design and evaluation process. The convener/chair of the study group was Adria Steinberg, the Academic Coordinator of the Rindge School of Technical Arts, who had been one of the conceptualizers of the RSTA internship programs. From January to June, the membership of the study group included the three teachers who were leading Senior Project seminars, one teachers who was serving as a mentor, one staff member from a local non-profit agency who was leading a Senior Project seminar for four students doing a group project on immigrant rights, the Language Arts Coordinator for Cambridge, the Assistant Principal of CRLS for Curriculum and Instruction, and the Dramatic Arts Coordinator for Cambridge. Cheryl Almeida, an outside consultant attended most study group meetings as a documentor/ evaluator.

Milestones

1) Students express their interest in writing.

We did a broad outreach to all seniors in the high school. By early January, we had received written expressions of interest from 38 students.

2) Seminar groupings are formed.

Our expectation was that all of the students interested in doing senior projects would be placed in a seminar with 8-10 of their peers. This proved to be a very problematic requirement, especially since the Senior Project seminar had not been built into the schedule when students originally signed up for the courses they would take for this period. By late January when the second semester began, only 14 of the initial group of interested students could find a way to fit a seminar into their schedules. (8 took us up on an offer of after-school seminars in order to be part of Senior Projects).

3. Students select mentors.

Our expectation was that every student would have an adult mentor who would meet with the student on a regular basis to help guide the student's work. We encouraged students to choose someone they knew with an interest and, hopefully, expertise in the subject area of their project. If they did not know such a person, we would help to match them with an appropriate mentor. In most cases, students did come up with their own mentors. Several students had more than one mentor, relying, for example, on a teacher for ongoing support and then occasionally meeting with someone with special expertise. A member of the senior project committee helped match the four students who did a project on immigrant rights with law students at Northeastern University.

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4) Project proposals are due.

Students brought a draft of a project proposal with them to the first meeting with their mentor and to their first seminar meeting. Over the next several weeks they helped one another and received help from their mentors in revising these proposals. Typed, final proposals were due shortly thereafter.

5) Students carry out the inquiry and action phases of the project.

Once the proposal was approved, we expected students to begin doing the project with the help of their mentors and with the help of their peers in the seminar. (Several students ended up not being able to join a seminar, and did the project just with the help of their mentors). All students knew that in addition to whatever experiential or "hands on" components their project might have, they were expected to produce an inquiry paper, in which they described the question or problem with which they began, what they learned about this issue, and how their work connected with work done by other people in this field. They were also to keep a journal as they went about doing their projects so that, at the end, they could write a reflection paper that would tell the story of how they went about doing their projects and what they learned about themselves as learners in the process.

6) Inquiry and Reflection papers are due.

As students entered the final phases of writing and revising their papers, we asked them to think about their work in relation to four broad categories: purpose, findings, reflection, and communication. Specifically, we encouraged them to be as clear as possible about their reasons for doing the project; to identify a coherent set of findings; to tell the story of their projects and analyze what they learned about learning; and to present their work in a way that would highlight its strengths and would observe the conventions of written and oral communication. In the seminar, students shared drafts of their papers. They also received copies of the guidelines that went out to project review panelists.

7) Students discuss their work with a panel of advisors and experts.

Each student presented/discussed his/her work with a panel of interested people. Members of the panel received the papers students had written, along with a feedback form, several days before the panel. Our expectation was that the panels would include the seminar teacher (as convener), the mentor(s), and additional subject area experts or friends or family whom the student wanted to invite. We tried to keep the panels to no more than seven people. The purposes of the panel were to provide a real audience for students' work; to give students an opportunity to engage in conversation about their work with adults; and to give students feedback on the strengths of the work as well as on aspects that needed further development. The format for the panel was for the student to begin with a 15-20 minute presentation of the work, followed by about 20 minutes of panel response, and finally by a closing statement from the student. Then panelists took an additional 5-10 minutes to complete their assessment/feedback forms.

8) Students present to an audience of parents, teachers, and friends.

On May 23, all of the students who did Senior Projects came together to present their projects to one another and to invited teachers, friends, and family. Each student took about 15 minutes to describe their project, using audio visual aids to enhance the presentation.

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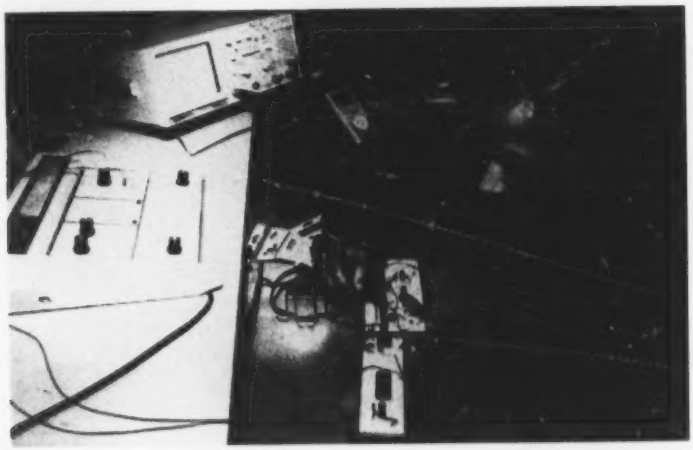

What We Learned

1. Our "Ready, Fire, Aim" approach to doing a study group had some very positive outcomes. The pressure of having students actually engaged in doing projects made the study group very productive and efficient. Because students, mentors, and seminar teachers were all relying on us, we had to develop curricular materials quickly and become clear as to our intentions, definitions, and expectations.

2. The students who had the most successful experiences doing Senior Projects shared some characteristics, including:

   - They came to the work with a passion or a mission (and were, in most cases, not simply doing it for the 5 English credits that were being offered).

   - They already had a relationship with the mentor they chose, and/or were in a program or course that provided a context for the independent work.

3. Most students felt that they were not prepared by previous academic work to do major independent work such as a Senior Project, and they found the experience of doing a Senior Project to be harder than they expected it to be.

4. Most students felt the experience was extremely worthwhile and would choose it again, even knowing how much work it was.

5. All of the students learned things they did not expect to learn. When asked to specify what they learned from doing Senior Projects, most students brought up both the new content and skills they acquired and their deepening understanding of themselves as learners.

6. The Senior Project curriculum and criteria we developed worked equally well for individual and team projects.

7. The Senior Project curriculum and criteria we developed worked equally well for projects based on student artistic expression (e.g. dance performance), for projects centering around an academic study (e.g. research on black achievement), and for projects based on work or volunteer experience (e.g. teaching in an elementary school classroom).

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What We Learned (continued)

8. Mentors wanted and needed additional orientation and support.

9. Students identified three qualities that are important for a mentor to have: expertise in the content/skills called for in the project; willingness to be accessible; openness to developing a relationship with the student.

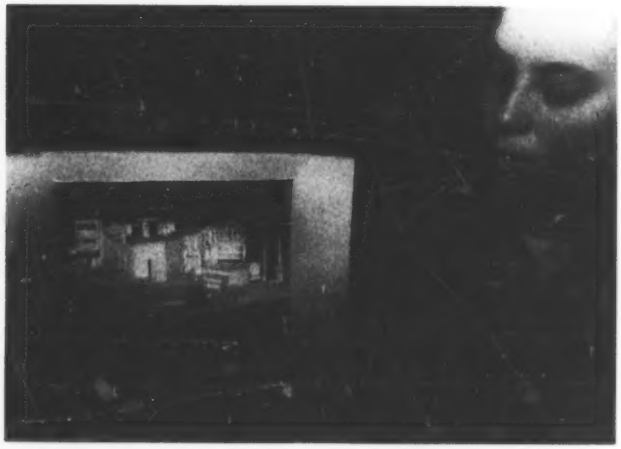
10. Panels were most productive when at least one member of the panel was an outside person with expertise in a domain related to the project.

11. The distinction between the inquiry paper and the reflection paper was not always clear to students or to panel members.

12. Students needed more help (and more time) preparing to present their work, both to the panel and the larger exhibition audience. Most made improvements (e.g. additional audio-visual aids) between the panel and the larger exhibition.

13. The roles of the seminar teacher and mentor overlapped somewhat, but also had distinctive aspects. Students generally viewed the seminar teacher as the person who kept them on task, moving along at the necessary pace, and the person to whom they looked for feedback on the written products. They looked to the mentor for help with the research design and with some of the content aspects of the project.

14. Seminar teachers found that they needed to be available to students outside of the seminar time, and to be very aware of the differing levels of support and assistance needed by different students.



Next Steps

The Senior Project study group continued to meet to complete the cycle of evaluation and planning. By the end of the school year they had created a series of recommendations for expanding the Senior Project program in 1996-97. They also worked on documenting the 1995-96 year's projects. In addition to students' written work, the documentation includes video footage of one panel, and of the final exhibition. Plans are under way to make slides of some of the visual work produced by students. All of these materials should be available as exemplars for next year's students.

At this point, the Senior Project seminar is on the master school schedule for 1996-97. This should help to alleviate the scheduling difficulties experienced during 1995-96.

Many important questions remain to be worked out. Among these are the following:

- What will be the duration of the Seminar (and of the projects)? In 1995-96, students were expected to do a Senior Project in a semester. Will there also be an option to spend most of the year doing a project?
- How will we get time with the mentors to provide them with support and training?
- How will we ensure that the seminar teachers have a weekly time (like the study group) to make curricular adjustments/improvements and to share student work?
- How can we ensure that students who need it get enough support from an adult with whom they have a relationship?
- How can we get more people with domain expertise involved as mentors and panelists?
- What incentives will help students to make the decision to participate in this program?
- If Senior Projects remain an ungraded experience, what formats/descriptions can we design to communicate project design and project quality to the students, their parents, their future colleges or employers, the school district?

Final Thoughts

Previously, the internship programs taught us the value (to students) of meeting regularly in small seminars in which students could help one another to develop and carry out complex multi-step projects. Our challenge now is to provide this type of experience and support for all students, not just those involved in internships. In addition, we want to give all students the opportunity to learn to work together in a seminar setting. Toward this end, we feel the Senior Project framework naturally lends itself to accomplishing these goals.

As to the usefulness of this approach in preparing students for learning after high school, we feel that although the emphasis in college is still very much on individual achievement, there is evidence that peer support can also be a very important factor in school success. Particularly for "nontraditional" students, that is, students whose

backgrounds make it unusual for them to be in college, participation in study circles is associated with higher grades and higher completion rates. Clearly teamwork is an important feature, not just in high performance work organizations, but in the academic world as well.

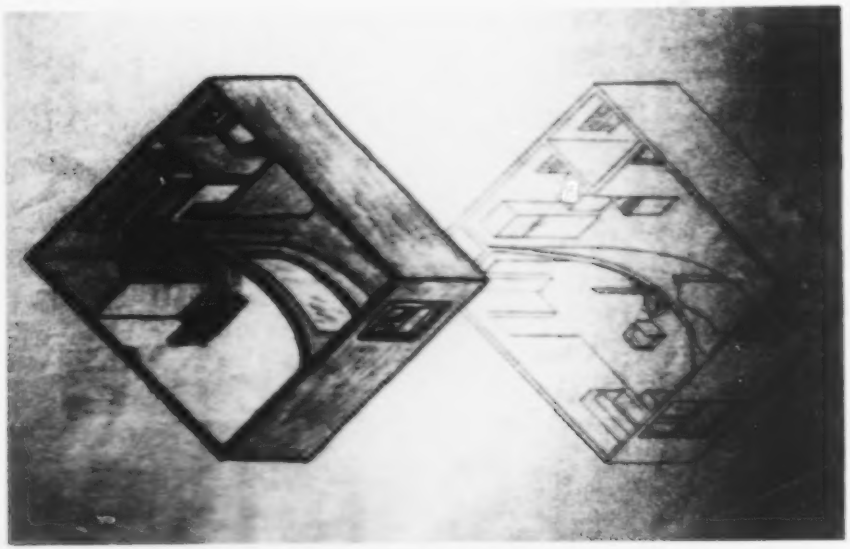
A final point on the benefit of Senior Projects deals with technology, specifically, the ability to use technology appropriately both in school and at work. In an attempt to prepare students, many schools now require a technological proficiency "exam" to be added as a graduation requirement. Too often, this comes down to students learning to keyboard, using old equipment and outdated software. No matter how hard high schools try to keep up with advancing technologies, students are more likely to encounter and master sophisticated hardware, software and other new tools in the workplace, and/or while trying to solve real world problems (as opposed to simply trying to pass a standard technology test). Students engaged in Senior Projects are much more

motivated to overcome the technological hurdles that lie in the path of their achievement of their project goals. The interest and willingness of these students is similar to that of internship students who must solve technological problems in their worksites.

In an assessment of his Senior Project experience, one student recently offered the following list of new skills he had acquired:

> ". . . I'm learning new computer skills which will be very helpful in business. I've learned how to make a spreadsheet and how to use that information to find a new vendor. I learned how to compare vendors and am more aware of how they are selected. . . I've also learned a lot of skills in terms of being aware of how offices are managed and learning the different jobs that people have."

We envisioned the Senior Project as a culminating experience of four years of high school. It was an opportunity for students to delve deeply into something, to produce something of value, and to present this work to others. Our goals were largely realized, through a process that combined student-centered inquiry and research, and the development of products) that were shared with an authentic audience.



Appendix

To obtain more detailed information about any of the projects, programs or curricula highlighted in the VIA manual, please direct inquiries to the appropriate contact people listed below:

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